2010 - 2011

NEW ZEALAND AMATEUR RADIO

CALLBOOK

AND RADIO REFERENCE

NEW ZEALAND ASSOCIATION OF RADIO TRANSMITTERS INC.

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Founder
Allen J. Little
QSM JP
ZL2GB

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Level 1, Ken and Little Building, 29 Queen Street West, Levin
NZ Radio For The Print Disabled (Inc)

PO Box 360, Levin 5540
For e-mail, refer to website: www.radioreading.org.nz

We read whole information as it is printed from:
- Newspapers
- Magazines
- Periodicals

This is a non-commercial, voluntary, Radio Station, established and operated by **New Zealand Radio For the Print Disabled (Inc).** The station commenced broadcasting on May 9 1987 and is funded from: donations, subscriptions, bequests and limited sponsorship along with assistance from **New Zealand On Air. Listeners' Comments and Reception Reports are particularly valued by the Station.**

An example of Amateur Radio serving the wider Community

'Canterbury Mountain Radio Service Inc'.
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Collection Points for Radios:

Rotorua: 24 Iles Road, Rotorua

Palmerston North: Hunting and Fishing

Wellington Mountain Radio Service: Hutt Valley (04) 564-6929

Wellington: (04) 479-2144 Otaki: (06) 364-8441

Masterton: (06) 377-0987 or (06) 377-0426

Palmerston North: (06) 356-9450 Wanganui: (06) 345-6624

Canterbury Mountain Radio Service: (03) 343-5029

DOC Te Anau & Wanaka (Fiordland & Mt Aspiring National Parks)

Methven: (03) 302-8410 Nelson: (03) 544-7085

Hokitika: (03) 755-6135

Takaka: (03) 525- 9576 Dunedin: (03) 454-3262

Southland Field Radio: (03) 216-3751

Listen to live traffic on 3345kHz and 3261kHz USB

2010/2011

NEW ZEALAND AMATEUR RADIO CALLBOOK AND RADIO REFERENCE

OFFICIAL JOURNAL OF THE NEW ZEALAND ASSOCIATION OF RADIO TRANSMITTERS INC.

ISSN 0110-5537

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The opinions expressed in this publication, including advertisements, are entirely those of the authors and do not necessarily reflect official points of view.

Typesetting and printing by
Wyatt & Wilson Print Ltd,
Christchurch, New Zealand.

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THE AMATEUR'S CODE

The Radio Amateur is:

CONSIDERATE ...
never knowingly operates in such a way as to lessen the pleasure of others.

LOYAL ...
offers loyalty, encouragement and support to fellow amateurs, to local clubs and to the New Zealand Association of Radio Transmitters, through which Amateur Radio is represented to Government, to the International Amateur Radio Union and to the International Telecommunication Union.

PROGRESSIVE ...
with knowledge abreast of science, a well-built and efficient station and operation above reproach.

FRIENDLY ...
slow and patient operating when requested; friendly advice and counsel to the beginner; kindly assistance, co-operation and consideration for the interests of others. These are the hallmarks of the amateur spirit.

BALANCED ...
radio is an avocation, never interfering with duties owed to family, job, school or community.

PATRIOTIC ...
station and skill always ready for service to community and country.

- Based on the original written by Paul M. Segal, W9EEA, in 1928.

AMATEUR RADIO

What is Amateur Radio?

Amateur Radio, also affectionally known as "Ham radio", is a hobby of constructing, experimenting and communicating with radio equipment. In New Zealand, the Ministry of Economic Development (Radio Spectrum Management) issues licenses to Radio Hams. Once licensed, an amateur can operate radio equipment from home, from their vehicles or from anywhere in New Zealand. A number of radio frequencies have been set aside for Amateur Radio. Using these frequencies a Ham can talk across town or around the world. The scope and possibilities are endless – from talking across town to your local repeater to operating in international contests or talking through Amateur Radio satellites.

Who can be Hams?

Just about anyone can become a Ham. Some famous muscians, actors, kings and prime ministers are Hams, but most are people from all walks of life who like communicating and experimenting with radio and electronics. Young people find Amateur Radio a great training ground, older people find "ham radio" an absorbing retirement hobby.

Amateur Radio is more than a hobby, it is also a service. Hams willingly contribute their time, equipment and operating skills whenever the need arises, especially during Civil Defence emergencies and search and rescue operations. The Amateur Radio Emergency Communicatons (AREC) are a sub group of NZART that organises emergency communications for the Emergency Services.

How do I become a Ham?

Passing a Ham license is quite easy. For an Amateur Radio license you need to correctly answer 40 out of 60 questions from a multi-choice question paper. The questions cover radio theory and regulations. You can download the questions from the public domain question-bank at http://www.nzart.org.nz/nzart/exam. As a newly licensed Ham you will be able to operate on amateur bands below 5MHz or above 25MHz. After three months operation and with 50 logged contacts you will be able to operate on all New Zealand amateur bands.

Where do I get more information?

The New Zealand Association of Radio Transmitters (Inc.) is a non-profit association of Amateur Radio Operators. NZART has branches and instructors in most of hte larger cities and town. For more information on Amateur Radio and details of a club near you, contact: The Business Manager, NZART, PO Box 40-525, Upper Hutt. Email nzart@nzart.org.nz or check out the NZART website at http://www.nzart.org.nz.

New Zealand Association of Radio Transmitters

INC

(Founder Member of the International Amateur Radio Union Region 3)

Mail to: BUSINESS MANAGER, PO BOX 40-525, UPPER HUTT 5140, NEW ZEALAND

PLEASE ENROL ME AS A NEW MEMBER AS FOLLOWS:

TRANSMITTING ☐ NON-TRANSMITTING ☐ STUDENT ☐ FAMILY ☐ OVERSEAS ☐ ASSOCIATE ☐ CONCESSIONARY ☐

MR MS MRS MISS	INITIALS	SURNAME	CALL-SIGN
ADDRESS			PREFERRED BRANCH, NAME OR NO
			PLEASE FIND ENCLOSED $
		POSTCODE	MY SUBSCRIPTION TO Dec 31 2011
OCCUPATION		DATE OF BIRTH	I agree to abide by the NZART Constitution Signature:

The information requested (other than date of birth) is for membership records required to be maintained under the Incorporated Societies' Act 1908. Date of Birth is requested for statistical purposes only.

Membership benefits include the automatic inclusion of transmitting call-sign holders' address details in *Call Book* (published annually).

If you DO NOT wish your details published please sign below:

I DO NOT want my address details published by NZART _____

IF YOU PREFER TO PAY BY CREDIT CARD PLEASE COMPLETE

VISA ☐ MASTER CARD ☐ EXPIRY DATE

CARD No.

Signature: _____

FROM THE EDITOR

This year's Call Book is a full edition and it will be published on a CD later in 2010 when back issues of *Break-In* and the WIA Call Book are available in an electronic format for inclusion on the CD.

Thanks to all those who have given their time to contribute to the content of this publication. I know I became a thorn in the side of some people when I believed that the updated information they could provide was essential to the usefulness of Call Book.

Online databases have little restriction as to how large they become. This makes it difficult to prune some of them to a suitable size while still retaining their usefulness for reproduction in Call Book.

Some people send me their updated address details, please remember that the *call-sign* information published in Call Book is that provided by the Ministry of Economic Development Radio Spectrum Management (RSM) from their database. At present we are unable to amend *call-sign* data due to legal constraints; therefore if you require changes to your *call-sign* information you must advise RSM by telephone or online; but also please advise NZART so that our records can be kept current. More details about this are available at the start of the *Call-sign* lists.

73 *de Lorne Douglas ZL2AHB / ZL3LSD*

CHANGE OF ADDRESS NOTIFICATION

To

The Business Manager, NZART

PO Box 40-525, Upper Hutt 5140

Name _____ Call-sign _____ Membership No. _____

Old Address

_____

_____

_____ Postcode _____

New Station Address:

_____

_____

_____ Postcode _____

***Break-In* postal address (if different):**

_____

_____

_____ Postcode _____

REMEMBER: if you change your address you **MUST** notify the Ministry of Economic Development (Radio Spectrum Management) 0508 776-463 **AND** the Business Manager, NZART.

PLEASE POST THIS FORM TO THE BUSINESS MANAGER, NZART AT THE ABOVE ADDRESS.

NZART MEMBERSHIP SERVICES

Liaison with the **Ministry of Economic Development, Radio Spectrum Management** group; for regulatory and radio spectrum matters and for the protection of the Amateur Service.

International Representation: the New Zealand amateur radio society and the New Zealand member society of the International Amateur Radio Union.

A National Headquarters: the focal point in New Zealand for Amateur Radio, enquiries and activities.

Public Service Involvement: by the Amateur Radio Emergency Communications (AREC) for Civil Defence, Search and Rescue, with related activities and training.

Amateur Repeater Service: co-ordination by the Frequency Management and Technical Advisory Group.

Amateur Beacon Service: co-ordination by the Frequency Management and Technical Advisory Group.

Spectrum Band-planning: co-ordination by the Frequency Management and Technical Advisory Group.

Technical Standards and Policies: co-ordination as required.

Monitoring System: to exercise continuing active protection for our radio frequency bands.

Satellite Co-ordination: liaison with amateur satellite organisations worldwide.

Satellite Support: donations and fundraising as required.

Headquarters Infoline: on-line frequently and direct to your mailbox with up-to-date information and news releases.

Official Broadcast: transmitted monthly.

Official Journal *Break-In:* published two-monthly, New Zealand Amateur Radio's continuing record.

Amateur Radio *Call-Book:* published annually.

NZART Website: www.nzart.org.nz for up-to-date information with past reference and activity records.

Annual Conference: our national forum.

VHF Convention: two-yearly, organised by enthusiasts, constructors and experimenters.

Education and Development Group: for promotion of Radio Training.

Examination Division: for Amateur Operator Certificates, *call-signs* and qualifications.

Reciprocal Qualifications: advice for travellers to or from New Zealand.

Third Party Insurance: for NZART activities, branches and AREC.

QSL Bureau: for dispatch and collection of QSL cards.

Contests and Awards: administration, branch, national and international.

Video Tape Library: for branch borrowing.

Morse Practice: arranged as required.

A selection of sale items from HQ: with member discounts.

Special Projects from time-to-time: such as funds for promoting radio in developing countries.

ZL6A Headquarters Station: of the New Zealand Association of Radio Transmitters.

NZART MEMBERS ORDER FORM

NZART Publications and Supplies	Price each	Non Member	Quantity required	Cost
Additional copies of *Break-In*	$6.00	$10.00		
Amateur Radio in New Zealand – The new rules explained	$8.00	$10.00		
Amateur Radio Logbook	$10.00	$12.50		
Amateur Radio Training Manual Fifth Edition (spiral bound)	$24.00	$30.00		
Call Book 2010-2011	$20.00	$30.00		
Ham Shacks, Brass Pounders and Rag Chewers	**$5.00**	**$20.00**		
Log Sheets (per 10)	$2.00	$5.00		
Secret Listening	$5.00	$10.00		
NZART Examination Questions (bound copy)	$15.00	$20.00		
NZART CD ROM Study Guide	$10.00	$12.50		
Examination DVD – Set of 13	**$50.00**	**$50.00**		
NZART Badge – *Call-sign*	$9.30	N/A		
– Life Member of Branch	$13.60	N/A		
– OTC Blue	$9.70	N/A		
– Plain	$3.70	N/A		
NZART Pen	$2.00	$4.00		
Plastic coated name badge	$10.50	N/A		
NZART Subscription: Transmitting/Family/Overseas/Student T = $95 / F = $125 / O = $110 (air) / O = $95 (surface) / Student $45				
			TOTAL $	

Prices include GST plus P&P and are subject to change without notice. Please include full remittance with order.
Non-members add 20% to all prices. Overseas members will incur additional postage dependent on country.

Examination Application Fee $5.00 (administration costs to Branch)

New/Lapsed Call-sign and Certificate of Competency	**$95.00***
Secondary Call-sign	**$50.00**
One Letter Call-sign	**$50.00**
Change of Call-sign	**$50.00**
Replacement Certificate	**$25.00**

** Receive one year free membership to NZART from 1 January until 31 December in the same year. If joining after 1 October, membership will expire 31 December the following year.*

NZART INFORMATION

NZART Address: Suite 9 19 Main Street Upper Hutt. P O Box 40 525 Upper Hutt 5140.
Ph: 04 939 2189, Fax: 04 939 2190
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Jamie Pye ZL2NN
E-mail: <webmaster@nzart.org.nz>
Phone: 04 528 9693

NZART's PRIORITIES:
The interests of its TRANSMITTING MEMBERS, and, the access by RADIO AMATEURS to bands throughout the RADIO FREQUENCY SPECTRUM, by membership and active support of the INTERNATIONAL AMATEUR RADIO UNION.

NZART Headquarters

Visitors welcome.
Hours 9am – 2.30pm Tuesday-Friday
Suite 9, 19 Main Street, Upper Hutt

Business Manager

Debby Morgan ZL2TDM
Phone: 04 939 2189
Fax: 04 939 2190
Email: <nzart@nzart.org.nz>
Postal: P.O. Box 40-525, Upper Hutt 5140

NZART Subscriptions 2010/11

T	Transmitting	$95.00
A	Associate	$95.00
B	Branch	$95.00
N	Non-Transmitting	$95.00
F	Family (Transmitting +)	$30.00
G	Family Non-Transmitting	$30.00
S	Student	$45.00
O	Overseas (No GST)	$95.00
O	Overseas Airmail	$110.00

Break-In Editor:

J. R. L. Walker ZL3IB
The Official Journal of the New Zealand Association of Radio Transmitters (Inc.)
Published bi-monthly.
All articles and letters to the Editor:

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Break-In
PO Box 1733
Christchurch 8015

CHANGE OF ADDRESS or DELIVERY PROBLEMS

Advise the Business Manager
PO Box 40-525, Upper Hutt 5140

Official Broadcast

J. A. Meachen ZL2BHF
E-mail: <zl6a@nzart.org.nz>
The monthly NZART Official Broadcast is made by ZL6A, AUCKLAND 3900kHz LSB on the last Sunday of each month except December, when the broadcast is made on the Sunday before Christmas.
The broadcast is also made on the National System and some VHF repeaters.
The time of the broadcast is 2000 hours. A repeat broadcast is made at 2100 hours.
Members and Branches are welcome to submit material to ZL2BHF, C/- NZART Headquarters, PO Box 40-525, Upper Hutt 5140 for inclusion in the broadcasts.

Conference Official Broadcast

The Official Conference Broadcast is held on the Sunday of Queen's Birthday Weekend at 2000 hours.

PRESIDENTS

1926-1927	E A Shrimpton	Z2XA	1953-1955	R H Hanley	ZL2GU
1928	R J Orbell	OZ1AX	1955-1958	H F Arnold	ZL3HA
1929	R J Orbell	ZL1AX	1958-1960	J F Freeman	ZL1VA
1930	T R Clarkson	ZL1FQ	1960-1962	G M Salt	ZL1CK
1931	H P V Brown	ZL3CG	1962-1964	R T Woodfield	ZL2VN
1932	D Wilkinson	ZL2AB	1964-1966	C G Liddell	ZL3ND
1933	N W Laugesen	ZL3AS	1966-1969	H Burton	ZL2APC
1934	W G Collett	ZL4BP	1969-1970	W R Hamer	ZL2CD
1935	C N Edwards	ZL1AA	1970-1972	D A Lloyd	ZL4PG
1936	W M Hall	ZL2BF	1972-1973	D E Cleland	ZL1IY
1937	R B Dodds	ZL4FK	1973-1974	J F C Johnson	ZL2AMJ
1938	L G Petrie	ZL2OV	1974-1977	W D Gorman	ZL2IY
1939	F W Sellens	ZL2MY	1977-1983	A G Godfrey	ZL1HV
1940	B E Jackson	ZL2FJ	1983-1985	D J Mckay	ZL3RW
1941-1942	W Fouhy	ZL2LB	1985-1991	T D Carrell	Zl3QL
1943-1944	C G Liddell	ZL2BI	1991-1992	T C King	ZL2AKW
1945-1946	E B Lough	ZL2OG	1992-1997	J A Meachen	ZL2BHF
1947-1949	C G Liddell	ZL2BI	1997-2001	A J Wallace	ZL1AMW
1949-1950	J F Freeman	ZL2AFB	2001-2005	A P Norden	ZL2SJ
1950-1951	C T Berry	ZL2BY	2005-2009	W L B Douglas	ZL2WP
1951-1953	W J Wainwright	ZL3LI	2009-	D R Symon	ZL2KH

HONORARY LIFE MEMBERS

1934*	N W Laugensen	ZL3AS	1980*	F R W Andrews	ZL2IJ
1943*	F W Sellens	ZL2MY	1982	G C Blackwell	ZL3NT
1946*	W Fouhy	ZL2LB	1983*	A G Godfrey	ZL1HV
1947*	W D Gorman	ZL2IY	1985	J F C Johnson	ZL2AMJ
1948*	J F Freeman	ZL2AFB	1986*	C W Parton	ZL3CP
1948*	G McB. Salt	ZL1CK	1987*	D Wilkinson	ZL2AB
1948*	T R Clarkson	ZL2AZ	1989*	R S H Morgan	ZL2GQ
1949*	A F Leader		1990*	G A Kilpatrick	ZL1BBS
1950*	W M Hall	ZL2BH	1992*	D J MacKay	ZL3RW
1950*	Mrs W Hall		1992	R L Baldwin	W1RU
1953*	R Cassey	ZL2IQ	1996	R W G Kingston	ZL4MK
1954*	J G Howard	ZL4FR	1998	R N Copeland	ZL2AKV
1961*	J M White	ZL2GX	2000	J A Meachen	ZL2BHF
1964*	H F Arnold	ZL3HA	2000	T D Carrell	ZL3QL
1966*	C G Liddell	ZL3ND	2002	G E Bold	ZL1AN
1972*	M R O Montgomery		2004	R E Knowles	ZL1BAD
1975*	A R Harris	ZL4CA	2005	J C Pye	ZL2NN

**Denotes deceased*

NZART EXAMINATION SUPERVISORS

Effective 23 June 2010

Auckland Central & Auckland Eastern Suburbs	
Morse & theory	
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North Shore 29	
Rosemary Boshier ZL1RO Ralph Boshier ZL4AG 30 Ayton Drive, Glenfield Ph: 09 444 5735 E-mail rboshier@ihug.co.nz	
South Auckland 65	
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Bob Holt ZL1BBZ 10 Collingwood Road, Waiuku Phone: 09 235 9549 E-mail fred.b@spacecom.co.nz	Bob will arrange venue
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Morse Expert	
Gary Bold ZL1AN 15 Kauri Road, Birkenhead Ph: 09 483 7240 Fax: 09 373 7445 E-mail g.bold@auckland.ac.nz	Gary will arrange venue
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Ashburton Branch 01	
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Walter E Smith ZL3CR 9 Wolsey Place, Hillmorton	
Dunedin Branch 30 Otago	
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Robin Holdsworth ZL1IC Sexton Road R D 1 Hamilton Ph: 07 855 4786 robin.judy@xtra. co.nz	
Hastings Branch 13 Hastings/Havelock North	
Leith Jennings ZL2AL 87 Auckland Road Napier Phone: 06 844 1226: Mobile: 021 050 8164 E-mail leejen@paradise.net.nz	

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Assistants	
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Tony Case ZL1UD E-mail zl1ud@nzart.org.nz 8c Breckons Avenue, Nawton Hamilton Ph: 07 850 5218 Mob: 027 661 0828	
Invercargill Branch 37 Southland	
Neville Checketts ZL4OX 21 Highfield Tce, Invercargill Ph: 03 216 6599 E-mail nevcheck@paradise.net.nz	Amateur Radio Centre 249 Ettrick St Invercargill
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Russ Lawrence ZL2BSQ	
Morse	
Bill Cox ZL2BIL Ph: 04 902 2630 E-mail: billcat@paradise.net.nz 5A Konini Grove, Raumati Beach 5032	
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Barry D Liddle ZL1CAY 3 Hinemotu Avenue, Kawerau Ph: 07 323 8970 Mob: 021 223 2901 barry.liddle@xtra.co.nz	
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Motueka Branch 24	
Jim Jackson ZL2BCG 246 Thorpe St, Motueka Ph: 03 528 8357 Fax 03 528 8707	Call to arrange venue
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Marton Branch 23	
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Nelson Branch 26	
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David Scott ZL2BCA As Above Cell: 0274 464 714	
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Tony Buckland ZL3HAM E:mail zl3ham@nzart.org.nz 3100 Tram Road, RD 1, Oxford E:mail buckland@scorch.co.nz	
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Ian Thompson ZL2IAN 8 Dampier Ave, Palmerston Nth Ph: 06 357 4545 E-mail i.Thomson@ucol.ac.nz	Manawatu Amateur Radio Society Totara Road Palmerston North (Near Racecourse rear entrance)
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Richard Gamble ZL1BNQ 19a Chiania Pl, Howick Ph: 09 537 1238 Wk: 09 272 0114 E-mail gambler@xtra.co.nz	
Morse	
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Geoff Reed ZL1AKY	
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Owen Pimm ZL3GM 50 Ohaka Meadows Drive Mandeville RD 2, Kaiapoi 7092 Ph: 03 3106070 E-mail owen.pimm@gmail.com	
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South Wairarapa 82	
Stan Mangin ZL2BLQ 33 West St, Greytown 5953 Phone: 06 304 9871 E-mail mangin@infogen.net.nz	

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Communication Group Branch 88	
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D K MaCartney ZL1DKM 5 Anderson St, Putaruru	
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Paul Greenwood ZL2GRE E:mail zl2gre@gmail.com 7 Cooper Street, Masterton	
Wanganui Branch 48	
Theory/Regulations	
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Morse	
Mike Newman ZL1BNB 30 Nikau St, Wanganui Ph: 03 344 6830 E-mail mnewman@clear.net.nz	Will arrange a venue
Wellington Branch 50	
Bob Stewart ZL2AMI 105 Orangi-Kaupapa Road Wellington Ph: 04 475 8448 E-mail rstewart@paradise.net.nz	Wellington College, Main Admin Building Basin Reserve Wellington
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Wellington VHF Branch 74	
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David Shae ZL4CP	
Kevon O'Sullivan ZL3ABY	
John Melse ZL3KC	

Westport Branch 49 Reefton/Buller	
Kim McLaughlin ZL3WPT 42 Dommett St, Westport Ph: 03 789 6942: E-mail paulkim@xtra.co.nz	Candidates call Kim to arrange where to go to sit exam
Whakatane Branch 51	
Eastern Bay of Plenty	
Alan McDonald ZL1PI 9 Gateway Dr, Whakatane Ph: 07 308 7740	Civil Defence HQ Waiewe Rd (off Hillcrest Rd), Whakatane
Janet (ZL1JAN) & Edwin (ZL1BBO) Musto 57b Peace St, Whakatane 3120 Ph: 07 307 1204 E-mail edwinmusto@xtra.co.nz or janetmusto@xtra.co.nz	
Whangarei Branch 28	
Charlie Moates ZL1DAC Ph: 09 434 7292 charliemoates@xtra.co.nz	NZART Br Club Rooms Whangarei Museum Heritage Park, Maunu, Whangarei
Morse	
Paul Slako ZL1PC Phone: 09 432 2841 E-mail: zl1pc@nzart.org.nz	

NZART Radio Science Education Trust

Application for Grant-in-Aid

Applications are invited from secondary school science teachers and other training providers for Grants-in-Aid from the NZART Radioscience Education Trust to promote the development of projects in the general areas of radio and/or electronics. It is anticipated that these projects will lead to entries in the local area Science and Technology Fair. Grants will not normally exceed $250.00

Applications should normally be received no later than 30th April of the year of application. Application forms may be obtained from:
The Trustees,
NZART Radioscience Education Trust,
PO Box 1733,
Christchurch 8140,
or from <trustee@nzart.org.nz>. Applications should be endorsed by the Head of Science or, for other organisations, the President/Chairperson.

"DX" WITHOUT "TX"

For over 60 years, the NZRDXL has catered for the interests of DX listeners in New Zealand.

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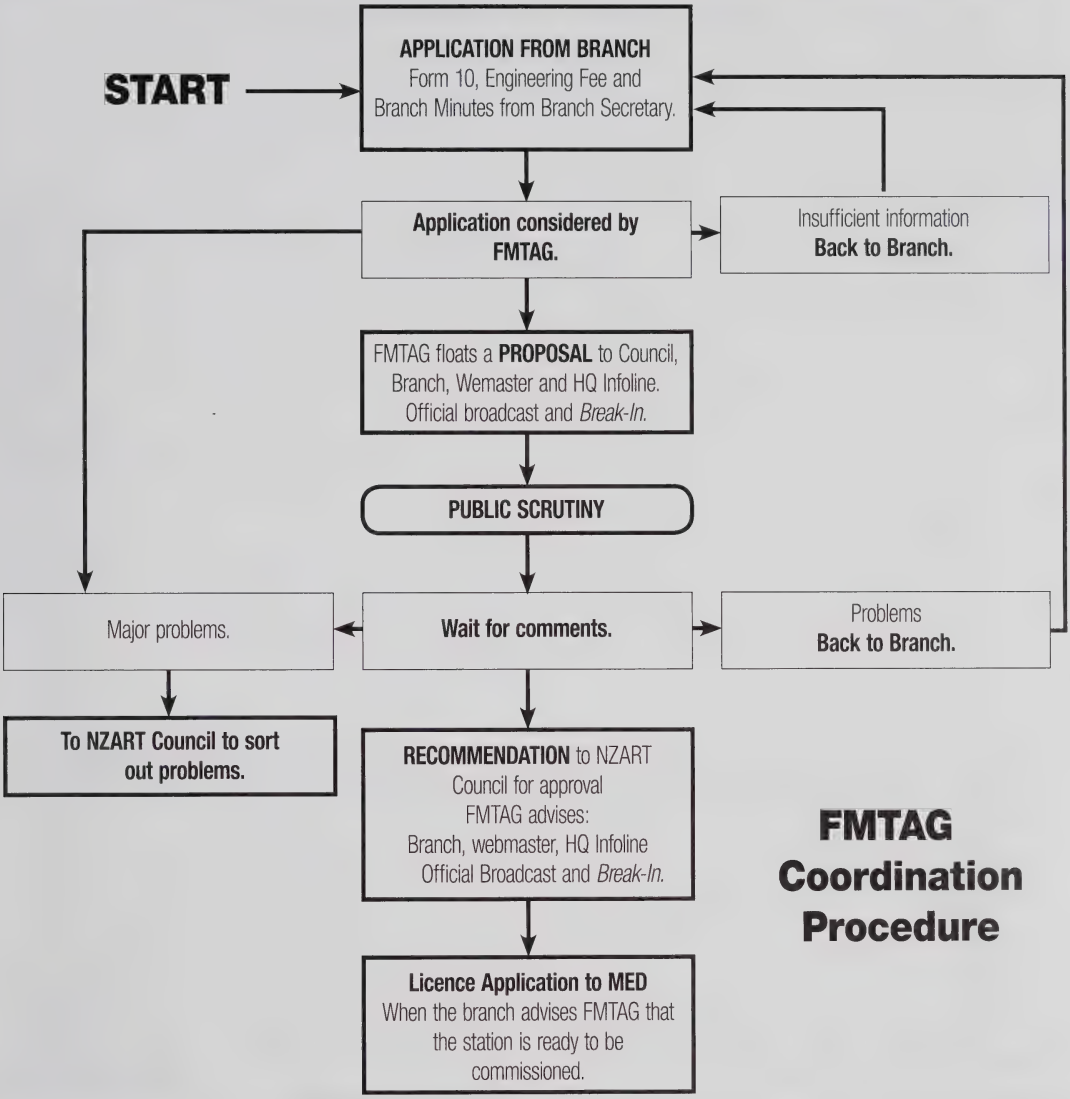
For more information please visit **www.radiodx.com** where you can download a sample DX-Times or request an info-pack from:
NZRDXL, PO Box 39-956, Howick, Manukau

FMTAG PROCEDURE


START
APPLICATION FROM BRANCH
Form 10, Engineering Fee and
Branch Minutes from Branch Secretary.
Application considered by FMTAG.
Insufficient information
Back to Branch.
FMTAG floats a PROPOSAL to Council, Branch, Wemaster and HQ Infoline.
Official broadcast and Break-In.
PUBLIC SCRUTINY
Major problems.
Wait for comments.
Problems
Back to Branch.
To NZART Council to sort out problems.
RECOMMENDATION to NZART Council for approval
FMTAG advises:
Branch, webmaster, HQ Infoline
Official Broadcast and Break-In.
Licence Application to MED
When the branch advises FMTAG that the station is ready to be commissioned.

FMTAG Coordination Procedure

FREQUENCY MANAGEMENT TECHNICAL ADVISORY GROUP (FMTAG)

FMTAG consists of:
Chairperson, Secretary and others as appointed by NZART Council The purpose and actions of the FMTAG are:

- Study and report to Council on matters affecting amateur radio frequencies.
- Plan future use of amateur bands
- Select frequencies for Amateur Fixed Stations
- Maintain a register of Amateur Fixed Stations
- Assists in preparing drafts for Council including submissions when needed, to the Ministry of Economic Development (Radio Spectrum Division) on behalf of the Amateur Service prior to each major ITU meeting or conference
- Band plans are developed by the FMTAG based on IARU recommendations, local requirements, and submitted to NZART Council for approval Application Forms for repeaters and beacons can be obtained from a NZART Councillor, NZART HQ or email your request to <fmtag@nzart.org.nz>.

Prepared by FMTAG MAY 2000

Radioscience Education Trust

The New Zealand Association of Radio Transmitters Incorporated

REPEATER/BEACON/LINK etc NZART FORM 10

(revised: 2010-06-01)

Please fill in the details and send by email to: fmtag@nzart.org.nz

Application date:

Originating Branch name and number:

Trustees (two required)

Trustee 1 (also the nominated MED contact person)

Name:

Call-sign:

NZART membership number (on *Break-In* wrapper):

Phone number:

Email address:

Trustee 2

Name:

Call-sign:

NZART membership number (on *Break-In* wrapper):

Phone number:

Email address:

Location in NZ2000 Metric Grid coordinates:

MED site name, or name on NZ2000 map:

Site ground height on NZ2000 map:

Desired name of station in Call Book:

Owner of site:

Owner of building housing station:

Are there Suppressed Records services at or near the site? (please circle) YES NO

Type of station: Amateur H

Voice repeater (Y/N): Digipeater (Y/N):

Data repeater (Y/N): ATV Repeater (Y/N):

National System repeater (Y/N): STSP repeater (Y/N):

Beacon (Y/N): Beacon call-sign requested:

Other (give details):

Band for this station:

Receive location: Amateur Mobile Area

Antenna configuration:

Antenna polarisation:

Antenna gain (dB isotropic):

Antenna height above ground (m):

Distances to other nearby antennas (m):

Direction(s) of maximum radiation (degrees true), or omni:

Feeder loss (dB) or feeder type and length:

Transmit circulator make and model number:

Transmit Duplexer or Output Filter make and model number:

Transmit Duplexer or Output Filter loss (dB):

Transmit modulation mode:

Receive Duplexer or Input Filter make and model number:

Receive Duplexer or Input Filter loss (dB):

Receive modulation mode:

Make of Tx: Model of Tx:

Make of Rx: Model of Rx:

Transmitter output power (W): dBW EIRP: dBW

Main Power source Mains (Y/N): Solar (Y/N):

Other (Y/N): Backup power source (Y/N):

Copy of minutes of Branch meeting approving construction:

Comments and/or System diagram/description:

Details checked by MED-Approved Radio Certifier/Engineer number:

Please make payment of $50 to NZART HQ, by cheque or to BNZ Upper Hutt: 02 0772 0209760 00
Please email FMTAG when payment has been made: fmtag@nzart.org.nz

NOTES AND HINTS ON COMPLETING NZART FORM 10

The aforementioned version of NZART Form 10 replaces all others. Please do not use old versions. The changes since the last version were necessary to obtain the extra information required by the certifying engineer and the MED Licensing Section.

Permanent location, from InfoMap 260 series map.
The MED requires the station location to better than 100 metres accuracy. This corresponds to 2 mm on the NZ260 series map. Please ensure that any GPS unit is set to the "NZ 1949" geodetic datum option. Please see page 13 of Jan/Feb 2001 Break-In for more details. In the case of Short Term Special Purpose (STSP) repeaters, please enter the storage location.

"Suppressed Records" Government radio services.
The licence details of some Government radio services, such as Police, do not appear in the public licence records. The MED has special licensing procedures for sites that have such services. It is helpful, and minimises delay in obtaining licences, if FMTAG is advised by the applicant, if the site is shared by, or is near to a site occupied by, a Government radio service. If possible, please identify the Government Department involved.

Antenna gain (dB isotropic).
The MED requires the (dB isotropic) antenna gain to better than 1 dB accuracy. There are two references for gain: dB isotropic (dBi) and dB dipole (dBd). There is 2.1 dB difference between these two references. FMTAG will work out the (dB isotropic) gain, if it is not known, from your description of the antenna.

Distances to other nearby antennas (m) and other technical details.
The MED requires FMTAG to calculate the likely levels of intermodulation from the inter-station coupling. This factor includes the inter-antenna coupling, between the antennas of the existing stations and the antenna of the proposed station, and the off-frequency attenuation of the filters, duplexers, circulators, feeder loss, etc.
FMTAG can calculate the inter-station coupling from the relative orientation and distance between antennas, and the make and model of the other equipment.
Please ignore all antennas more than 10 wavelengths away, for example, more than 20 metres away at the 2-metre band. Please include all antennas for the other stations operating on frequencies between half and twice the frequency of the proposed station, for example, all antennas between 72 MHz and 296 MHz for a 2 metre station. However, please include all Amateur antennas, because of the harmonic relationship between most of the Amateur bands.
The relative antenna orientation also affects the inter-antenna coupling. A simple sketch would be useful.

Make and model number.
Home made equipment is acceptable to the MED. Please put "Amateur" followed by the surname of the constructor, in the applicable space.
However, for the protection of the Repeater Trustees, the equipment should be tested to ETS 300684, prior to being turned on. ETS 300684 is about 10 dB stricter than RFS25, for FM voice transmitters, and 10 dB stricter than RB16, for ATV transmitters. The MED requires unwanted emissions outside the Amateur bands to comply with ETS 300684.
The level of unwanted emissions is also determined by the inter-station coupling. The MED has the right to require that unwanted emissions are suppressed to a greater extent than required by ETS 300684, and to turn off a station until the necessary measures, such as additional filters or circulators, are taken to achieve this.

AUDIO-VISUAL LIBRARY

Video Tape Library

Cost of hire for each video is $5.00 including P & P.

1) **All China RDF Competition**
   A serious 30-minute look at Amateur Radio Direction Finding – an official sport in China.
2) **The Happy Flyers Techniques of RDF**
   A 26-minute audio-visual presentation of the theory and techniques for VHF Radio Direction Finding.
3) **The Aerial Circus with Dud Charman G6CJ**
   45 minutes. Verification of the theory of the operations of a variety of VHF and HF antennas. See the theory confirmed by means of scale model antennas.
4) **Amateur Radio's Newest Frontier**
   30 minutes. A recent production from ARRL. Looks at the Radio Amateurs' involvement in space.
5) **NAREC 50**
   A 60-minute production by Branch 25. Looks at the Napier Conference and the 50th Anniversary of AREC.
6) **Communications – The Hidden Revolution**
   135 minutes. An address and demonstration by the Engineerib-Chief, New Zealand Post Office, on modern communications techniques and methods.
7) **The Integration and Launch of AMSAT OSCAR-10**
   35 minutes. A preview of the presentation and launch of OSCAR-10 by Werner Haus ZJ4KQ.
8) **The Wonderful Wide World of Amateur Radio**
   27 minutes. Produced by JARL. A look at Amateur Radio in Japan.
9) **W. (Bill) Orr W6SAI Whakatane Conference Opening June 1988**
   20 minutes.
10) **1987 Dayton Hamvention – A KGØP Production**
    30 minutes.
11) **ARRL's New World of Amateur Radio 1988**
    Via WA6AI.
12) **W6AI Sunday 05/06/1988**
    Lecture on Linear Amplifiers.
13) **Component Identification – ZL1TOF**
    18 minutes.
14) **Launch of Ariane IV 15/06/1988**
15) **RSGB's Amateur Radio for Beginners**
    43 minutes.
16) **Waiting for the Big One**
17) **Fuji-2 JAS-1**
    Japanese Amateur Satellite 1B.
18) **Ham Radio In Space**
    30 minutes. ARRL.
19) **SAREX – Shuttle Amateur Radio Experiment**
    19 minutes. ARRL.
20) **"More Than Radios" from Zman Productions**
    This video is a very special message to Amateur Radio Operators. It is a strong emotional video and not like any other video you have seen about Amateur Radio.
21) **Getting Started in Packet Radio**
    From CQ Communications Inc. This video will help demystify the exciting but sometimes confusing world of Packet Radio.
22) **Dayton Hamvention 1966**
    Vaughan Henderson ZL1TGC.
23) **DXpedition May 1996 to Raoul Island – ZL8RI**
24) **What's Happening in ARDF**
    7 minutes.
25) **ZL3CI – Campbell Island 1999 – James Brookes 9V1YC** 60 minutes. Further copies of this can be purchased $US25.00 plus P & P through http://www.dxvideos.com/.
26) **An Interview with Gerald Beattie – June 21, 1989**
    28 minutes.
27) **NZART Amateur Television Official Broadcast March 30, 1986**
28) **NZART 75th Anniversary Conference Auckland 2001**
29) **Commemoration at Musick Point 2003**
30) **ZL2AMJ Investitute at Government House August 2002**
31) **The Secret Wireless War (new)**
    120 minutes. Beyond Bletchley Park and Black Propaganda

CD-ROMS for Hire

Costs for hire of each CD-ROM is $6.00 including

1) **Bell-Goyder QSO October 18, 1924**
2) **513A IOTA Yambe Island DXpedition, July 1-10, 2000**
3) **NZART 75th Anniversary Conference**
4) **Otago Branch History (1923–2003) 75th**
5) **NZ WARO History (1962–2002)**
6) **The Story of Enigma**
   A webpage display (html and jpg files). Not recommended for Branch entertainment by projection.

ARRL Ham Software Library

1) **Ham Radio CD Rom 1968–1976**
2) **Ham Radio CD Rom 1977–1983**
3) **Ham Radio CD Rom 1984–1990**
4) **Tune in the Universe—Paul Shuch N6TX**
5) **Ham Shack Brass Pounders & Rag Chewers on CD**
6) **NZART Convention 2006 Radio Astronomy by Clive Rowe**
7) **NZART Convention 2006 Time & Frequency by Dave Brown ZL3FJ**
8) **NZART Convention 2006 How Sound Card Digital Modes Work** by ZL1BPU

NZART
Devoted to AMATEUR RADIO since 1926

BRANCHES AND MEMBERSHIP

A Policy Statement by Council (Revised 1996, second revision June 2005)

Members will be aware of the requirement in paragraph 7.3 of the Association Constitution that Branches must not admit to membership persons who hold an amateur station licence, but who are not members of the Association.

Over the years there have been attempts to repeal or modify these provisions, but successive National Conferences have made it quite clear that members will have none of it. The rationale for this Constitutional provision is that it provides at least one way in which non-members can be denied the privileges which membership of the Association brings. We cannot stop our non-member brethren enjoying some benefits – such as the negotiations the Association conducts with the licensing authorities, the use of repeaters, and the enjoyment of the benefits of which bandplans bring. Council is firmly of the view that it is unfair to those that do pay their subscriptions if the lot of non-members is made easier by the ready availability of member's privileges which the Association is, in fact, able to withhold. Further, the Association has to take into account the feelings of its many voluntary workers, who devote many hours to Association matters, and, in addition, pay their subscriptions as well. These persons have even greater cause to complain if the Association makes benefits available to non-members who do not contribute to these benefits by at least joining the Association and paying a subscription.

Branch Officers

It is disturbing to Council to find that some Branches not only fail to have regard to their Constitutional obligations by ensuring that licensed amateurs who are not Association members do not join the Branch. Some Branches also have as Branch Officers persons who are licensed amateurs but not members of the Association. This is clearly unconstitutional. If an Officer is not an Association member, but is a licensed amateur, then there is a breach of the Association Constitution. This should also be a breach of the Branch Constitution - if it is not, the Branch Constitution is faulty and must be brought into line. (See the Association's Constitution – paragraph 7.3(c).)

Regrettably there are one or two branches that indulge in this fiction. The Branch attempts to evade its responsibilities to NZART, whether arising under paragraph 7.3 or otherwise, by purporting to distinguish between the local club and the NZART branch. This fiction ignores the realities, and is not acceptable. The reality is that the local club itself is the NZART branch, and the branch constitution must be changed to reflect this commitment to NZART if that is necessary. Any attempt (for that is all that it is) to circumvent the Association Constitution by resorting to this fiction is unfair to the local NZART members, other NZART members, and the Association itself.

Relationship between Branches and the Association

Sometimes, Branch members criticise these rules, often using catch phrases such as "breach of human rights", or "interference with independent clubs". These provisions of the Association Constitution are nothing of the sort. They are part of the contract that members make when they join the Association. By applying to become or by remaining an Association Branch, the Clubs or Branches surrender their independence to the extent required to conform to the Association's Constitution. Branches are expected to keep their houses in order; if they are not prepared to do this, then they should prepare to surrender their status as a Branch. There is nothing in the Human Rights Act to prevent the Association and its branches from discriminating between members and non-members.

Whose job is it to be the policeman?

The answer is – nobody's and everybody's. The Association's Constitution does not specifically charge Council or any Officer with the task of enforcement. So long as we remain members, we are all parties to the contract represented by the constitution and we each individually have that responsibility. If a Branch is incorporated in its own right, then the branch in its corporate capacity also has that duty.

Hardship

Hardship is not a ground for failing to become an Association member. Association subscriptions can be remitted under paragraph 5.1(f) of the Association Constitution and Council will authorise this where there is genuine hardship. But Council's experience has been that the genuine hardship is rare indeed. Many claims of hardship over the years have been found not to be genuine. The member should initially make application to the General Secretary for this concession. If considered necessary Council might then discretely seek further information from the Branch. Council expects that there would be very few cases in the country at any one time. The privacy of the applicant is respected by ensuring that as few persons as possible within the Association are aware of the application.

In cases of hardship, subscriptions may be paid by monthly automatic payment. The applicant should discuss this option with the General Secretary.

Why are we telling you this now?

Council has never said anything else. But there are now some situations that create special problems for the Association.

The Association enters into contracts with private landowners, public corporations and State Owned Enterprises relating to right of entry to land for the siting of repeaters. These contracts recognise potential liabilities and require the Association as a condition of the contract to take public liability insurance, which could be up to $2,000,000 or more. This insurance will be taken on terms that will extend to protect both the Association and individual members. Naturally, the corporations we are dealing with take comfort in this insurance, as they know that while the insurance is in place the Association has the indemnities required to meet any claims. The reality is that to come within the Association's cover, individuals must be members. The Association has no intention of paying additional premiums to insure against the actions of non-members. If an individual incurs liability as agent of the Association, then that individual must be a member to take the benefit of any cover the Association arranges. The Association will not appoint non-members as its agents, as this would nullify the insurance cover.

As branches have responsibility with the Association for repeaters, Branch Officers are required to be Association members. This is no more than the Constitutional requirement. Because of these matters, Council will, in future, have to be more active in seeing that the Constitution is observed. As the appointment of repeater trustees is an Association matter, even if exercised through Branches, repeater trustees must also be members. This, likewise, is a necessary consequence of the provisions of the Constitution. Council, in future, will have to ensure that repeater trustees are Association members, not only because this is a Constitutional requirement, but also to ensure that the persons responsible for the operation of repeaters have adequate insurance cover to meet the requirements of our contracts with the public corporations.

Action

Take action now to ensure that your Branch complies with the Association Constitution. Your Councillor will help you with advice as required.

This policy statement was first published in the August 1990 Break-In. It is now reissued in a slightly revised form.

NZART Council February 1996

Second revision ZL1UD, ZL1DD, ZL2BHF June 20 2005

The Constitution of the New Zealand Association of Radio Transmitters Incorporated

is available from: The Business Manager, NZART, Freepost 3565, PO Box 40-525, Upper Hutt 5140
or NZART URL: http://www.nzart.org.nz/nzart nzart@nzart.org.nz

NZART BRANCH DIRECTORY

Alphabetical List of Branches

			Date of update
01	M	Ashburton	2010
02	N	Auckland	2010
66	N	Auckland VHF Group	2010
84	N	Bay of Islands	2010
04	N	Cambridge	2010
*	M	Canterbury (CARDS)	2010
15	*C*	*Central Hawkes Bay*	
61	S	Central Otago	2010
05	M	Christchurch	2010
56	M	Christchurch West	2010
51	N	Eastern Bay of Plenty	2010
08	S	Eastern Southland	2010
09	*C*	*Egmont*	
78	N	Far North Districts	2010
70	*C*	*Fielding*	
10	N	Franklin	2010
11	C	Gisborne	2010
12	N	Hamilton	2010
14	*C*	*Hawera*	
13	C	Hawkes Bay	2010
58	*N*	*Helensville*	
80	N	Hibiscus Coast	2010
16	C	Horowhenua	2008
79	*N*	*Howick & Districts*	
17	N	Huntly	2010
18	C	Hutt Valley	2010
19	C	Inglewood	2010
76	*M*	*Kaikoura*	
69	C	Kapiti	2010
67	N	Kawerau	2010
20	C	Manawatu	2010
59	*N*	*Mangakino*	
21	N	Manukau	2010
22	C	Marlborough	2010
23	C	Marton & Districts	2010
44	N	Matamata	2010
85	*N*	*Mercury Bay*	
24	C	Motueka	2010
25	C	Napier	2010
26	C	Nelson	2010
27	C	New Plymouth	2010
37	S	Southland	2010
68	M	North Canterbury	2010
64	S	North Otago	2010
29	N	North Shore	2010
52	*C*	*Northern Hawkes Bay*	
73	*N*	*Northern Wairoa*	
72	N	Opotiki	2010
30	S	Otago	2010
31	*C*	*Pahiatua*	
65	N	Papakura	2010
54	*C*	*Patea*	
75	*S*	*Queenstown*	
83	N	Raglan	2010
32	C	*Rahotu Coastal*	
62	M	Reefton-Buller	2010
71	N	Rodney	2010
33	N	Rotorua	2010
34	M	South Canterbury	2010
35	S	South Otago	2010
87	M	South Taranaki	2010
36	*M*	*South Westland*	
82	M	Southern Wairarapa	2010
86	M	Suburban	2010
06	C	Tararua	2010
38	*N*	*Taumarunui*	
60	N	Taupo	2010
39	N	Tauranga Districts	2010
88	N	Tauranga ECG	2010
77	*N*	*Te Aroha & Districts*	
40	N	Te Awamutu	2010
53	N	Te Puke	2010
41	N	Thames	2010
42	C	Titahi Bay	2010
57	*N*	*Tokoroa*	
63	C	Upper Hutt	2010
43	N	Waihi & Districts	2010
81	N	Waikato VHF	2010
45	*C*	*Waimarino*	
46	C	Wairarapa	2010
47	C	Waitara	2010
55	N	Waitomo	2010
48	C	Wanganui	2010
50	C	Wellington	2010
74	C	Wellington VHF	2010
03	N	Western Suburbs	2010
49	M	Westland	2010
28	N	Whangarei	2010

Letter after Branch number donates electorial district – N=Northern, C=Central, M=Midland, S=Southern. *Italics* = Branches in recess.
Affiliated Branches: Canterbury Amateur Radio Development Society Inc (CARDS).

01 Ashburton (Inc)

Branch Call-sign	ZL3AF
Physical Address	Aviation Museum, Airport, Seafield Rd, Ashburton
Postal Address	60 Beach Road, Hampstead, Ashburton, 7700.
President	Jim Nelson ZL3ND
Vice President	Brian Rickard ZL3TJW
Secretary	Mike Trump ZL3TPQ
Treasurer	Robin Williams ZL3REW
Contact Person(s)	Mike Trump ZL3TPQ
Contact Ph No	(03) 308-7119
E-mail	mtrump@orcon.net.nz
Meeting Info	Second Monday each month (except December and January) at 1930 hours at Clubrooms

02 Auckland (Inc)

Branch Call-sign	ZL1AA
Physical Address	400 St. Johns Road, Kohimarama, Auckland 1071. Located down the back of the Scarbro yard.
Postal Address	PO Box 18-003, Glen Innes, Auckland 1743.
President	Gwynne Rowe, ZL1AAR
Vice President	Peter Ellis, ZL1LS
Secretary	Wallace Bottomley ZL1WAL
Treasurer	Wallace Bottomley ZL1WAL
Net Info	145.775 MHz repeater and on Mondays at 2000 hours and 3645 kHz on Mondays at 2100 hours
Contact Person(s)	Selwyn Ross ZL1BRC, Bob Murphy ZL1AFU
Contact Ph No	(09) 575-8847
E-mail:	zl1brc@nzart.org.nz; (09) 534-5950 zl1afu@nzart.org.nz
Meeting Info	Every 3rd Saturday of the month (Feb to Nov) at 1330 hours after a midday BBQ in nice weather.
Committee Meeting	First Tuesday each month (except January) at 1930 hours.
Web	www.qsl.net/zl1aa
General Info	Clubrooms open on Saturday mornings from 1000 hours for people to drop in, have a ragchew, use the club's rigs, search through the back issues of QST, or simply just have a cuppa.

03 Western Suburbs Radio Club (Inc)

Branch Call-sign	ZL1AC
Physical Address	3000 Great North Road, New Lynn, Waitakere City
Postal Address	PO Box 15-122, New Lynn, Waitakere City 0640
President	Ian Sangster ZL1RCA
Secretary	Roy Milam ZL1WI
Net Info	VHF 146.5250MHz simplex Wednesday at 1930 hours, HF 3623KHz Friday at 1930 hours
Contact Person(s)	Ross Reddell ZL1VRR
Contact Ph No	(09) 629-0504. E-mail: ross.reddell@xtra.co.nz
Meeting Info	Second Monday of each month at 1930 hours except January at club rooms
Committee Meeting	Fourth Wednesday at club rooms at 1930 hours
Web	www.qsl.net/zl1ac
General Info	Branch 03 is dedicated to ATV, Contesting and AREC. The Club also runs an APRS digi, ZL1AC-1 on 144.550. Branch 03 extends a welcome to all hams to visit us on air or at the clubrooms.

04 Cambridge Radio Club

Branch Call-sign	ZL1HP
Physical Address	22a Taylor Street, Cambridge
Postal Address	Cambridge Radio Club, c/- Cambridge Community Centre, 22a Taylor St, Cambridge 3434
President	Gary Stevens ZL1TTC, E-mail: support@informatics.co.nz
Secretary	Ian Honey ZL1IAN, E-mail: ianh@waikato.ac.nz
Treasurer	Ian Honey ZL1IAN, E-mail: ianh@waikato.ac.nz
Contact Person(s)	Gary Stevens
Contact Ph No	(07) 827-6474 E-mail: support@informatics.co.nz
Meeting Info	Every Wednesday at 1930 hours, 22a Taylor St.
Committee Meeting	Last Wednesday of month, 1930 hours, 22a Taylor St.
General Info	NZART Contact: Mr. P.C. Sadgrove ZL2UJ, E-mail: zl2uj@nzart.org.nz

05 Christchurch Amateur Radio Club (Inc)

Branch Call-sign	ZL3AC
Physical Address	27 Galbraith Avenue, Avonside, Christchurch
Postal Address	PO Box 1733, Christchurch 8015
President	David Holland ZL2IC
Vice President	Mike Barnes ZL3TMB
Secretary	Rory Deans ZL3HB
Treasurer	Richard Prattley ZL3UE
Net Info	Cass Peak 145.625MHz linked to Tekapo 146.800MHz on Sundays at 2000 hours (except delayed last Sunday of the month after Official Broadcast)
Contact Person(s)	Rory Deans ZL3HB
Contact Ph No	(03) 325-4181. Email: rory1@xtra.co.nz
Meeting Info	First Wednesday each month (February to December) at 1930 hours. "Social get-together & technical night" every Tuesday night 1930 hours (February to December)
Committee Meeting	Monday after monthy club meeting
Web	http://www.nzart.org.nz/branches/chch/branch05/
General Info	Publications: Hamlarks–contact David Holland ZL2IC

06 Tararua District Radio Club (Inc)

Branch Call-sign	ZL2IB
Physical Address	Woodville Community Centre, Ross Street, Woodville
Postal Address	57 Cole Street, Dannevirk 4930
President	Jim Edwards ZL1UBE
Vice President	Paul Harris ZL2PFH
Secretary	Stephen Cooper ZL2WAU
Treasurer	Stephen Cooper ZL2WAU
Net Info	Every Friday Night at 2000 hours on Wharite 146.650 MHz
Contact Person(s)	Stephen Cooper ZL2WAU or Tom Fleming ZL2TF
Contact Ph No	(06) 374-8288 or (06) 376-7638
Email	rosewoodvilla@xnet.co.nz or t.j.fleming@paradise.net.nz
Meeting Info	Second Sunday of each month (except December and January) in the Supper Room at the Woodville Community Centre, Ross Street, Woodville at 1330 hours
Web	http://www.qsl.net/zl2ib
General Info	Charities Entity Registration Number CC35193 Club repeaters: Wharite Voice 146.650 Tararua Voice/Data 145.625 Wharite Voice/Data 439.600 STSP Voice 146.825

08 Eastern Southland

Branch Call-sign	ZL4AL
Postal Address	C/- PO Box 9, Wyndham 9849
President	Murray Giles ZL4MG
Vice President	Dick Whyte ZL4AQ
Secretary	Lindsay Eunson ZL4LC
Treasurer	Ron Falconer ZL4RMF
Contact Person(s)	Colin Robertson ZL4KJ
Contact Ph No	(03) 208-5979
Email	Lindsay Eunson linz.e@xtra.co.nz
Meeting Info	3rd Wednesday of the month at 2000 hours at Latham Road Clubrooms

09 Egmont

Branch Call-sign	In recess

10 Franklin Amateur Radio Club (Inc)

Branch Call-sign	ZL1SA
Physical Address	Stadium Drive, Pukekohe.
Postal Address	C/- 25 John Street, Pukekohe 2120
President	Colin Shuker ZL3CJS
Secretary	Tom McDonald ZL1TO
Net Info	3700 kHz on Sundays at 0900 and Bombay 690 on Sundays at 0930
Contact Person(s)	Bob Holt ZL1BBZ
Contact Ph No	(09) 235-9549. E-mail: zl1to@nzart.org.nz
Meeting Info	Third Tuesday each month at 2000 hours
Committee Meeting	First Tuesday each month at 1930 hours

11 Gisborne Amateur Radio Club (Inc)

Branch Call-sign	ZL2AA
Physical Address	Scout Hall, Bryce Street, Gisborne
Postal Address	12 Grundy Street, Gisborne 4010
President	Peter Orner ZL2TRG
Vice President	Rowley Haisman ZL2APH
Secretary	Ric Coleman ZL2RIC
Treasurer	Douglas Birt ZL1BFS
Net Info	146.900 MHz every Sunday from 2100 hours
Contact Person(s)	Ric Coleman
Contact Ph No	(06) 868-4721 or 021-2140624
Email	ricol@xtra.co.nz
Meeting Info	General meeting second Monday each month (excluding public holidays) at 1900 hours.
Committee Meeting	Committee meets as per monthly arrangements.
Web	http://ZL2AA.OnNZ.net/
General Info	IRLP Node 6105. Gisborne. New Zealand

12 Hamilton Amateur Radio Club (Inc)

Branch Call-sign	ZL1UX
Physical Address	88 Seddon Road, Hamilton.
Postal Address	PO Box 606, Waikato Mail Centre, Hamilton 3240
President	Robin Holdsworth ZL1IC
Secretary	David Nation ZL1TCE and Phil King ZL1PK
Net Info	3575 kHz on Mondays at 1930 hours and 146.525 MHz FM simplex on Tuesdays at 2000 hours
Contact Person(s)	Phil King ZL1PK
Contact Ph No	Phil King (07) 847-1320 or Gavin Petrie (07) 843-0326
Email	branch.12@nzart.org.nz
Meeting Info	General Meeting third Wednesday of each month (except December) at 1930 hours at the clubrooms
Committee Meeting	Executive Meeting first Wednesday (except January) at 1930 hours at the clubrooms
Web	http://zl1ux.tripod.com
General Info	Annual Market Day in mid August each year

13 Hawkes Bay Amateur Radio Club

Branch Call-sign	ZL2AS and ZL2QS
Physical Address	Surf Lifesaving Club Rooms, Windsor Park, Grove Road, Hastings
Postal Address	C/- PO Box 2403, Stortford Lodge, Hastings 4153
President	Warren Harris ZL2AJ
Secretary	David Walker ZL2DW
Net Info	3615 kHz and 147.250 MHz Repeater on Sundays at 0900 hours
Contact Person(s)	Warren Harris ZL2AJ
Contact Ph No	0800 219 284
E-mail	warren@technaserve.com or david@apexradiocoms.co.nz
Meeting Info	Fourth Wednesday each month (except December) at 1900 hours at Surf Livesaving Club Rooms, Grove Road, Hastings (Splash Planet car park)

14 Hawera Amateur Radio Club

Branch Call-sign	In recess, absorbed into South Taranaki, Branch 87

15 Central Hawkes Bay

Branch Call-sign	In Recess

16 Horowhenua

Branch Call-sign	ZL2DS
Postal Address	C/- 2 Oslo Place, Levin
President	Kenneth Ireland ZL2KI
Secretary	Steve Jepson ZL2KG
Net Info	3720 kHz on Wednesdays at 2030 hours and 147.575 Simplex on Sundays at 0900 hours
Contact Person(s)	Kenneth Ireland ZL2KI
Contact Ph No	(027) 444-9449
E-mail	br16nzart@gmail.com
Meeting Info	Third Monday of Every Second month (same as *Break-In*) at 1930 hours

17 Huntly Radio Club

Branch Call-sign	ZL1BL
Physical Address	520 Kainui Road, Taupiri
Postal Address	195 Rotongaro Road, RD 2 Huntly 3772
President	Terry East ZL1BGS
Secretary	Jim Williams ZL1BOS
Contact Person(s)	Terry East
Contact Ph No	(07) 826-6730 or (07) 824-6805
Email	granteast1@thenet.net.nz
Meeting Info	Fourth Tuesday at 1930 hours at 520 Kaunui Rd. Taupiri

18 Hutt Valley (Inc)

Branch Call-sign	ZL2HV
Physical Address	Off Birch St, Philip Evans Reserve, Waterloo, Lower Hutt
Postal Address	PO Box 30-519, Lower Hutt, 5040
President	Barry Warner ZL2HO
Secretary	Chris Purcell ZL2POS
Net Info	3675 kHz on Sundays at 0900
Contact Person(s)	President Barry Warner ZL2HO
Contact Ph No	(04) 566-5829
Email	warnerba@xtra.co.nz
Meeting Info	First Monday each month at 1930 (except for June which is on 2nd Monday for AGM). Also every Friday at 1930 (informal)
Web	http://www.zl2hv.wellington.net.nz

19 Inglewood

Branch Call-sign	ZL2PT
Physical Address	34 James St., Inglewood 4330
Postal Address	1778 Mountain Road, RD 10, Inglewood 4390
President	Peter Cramer ZL2AIS
Secretary	Tarry Martin ZL2KV
Net Info	As required
Contact Person(s)	Peter Cramer ZL2AIS
Contact Ph No	(06) 756-7314
Meeting Info	As Required

20 Manawatu Amateur Radio Society (Inc)

Branch Call-sign	ZL2KO
Physical Address	65 Totara Road, Palmerston North 4412
Postal Address	PO Box 1718, Palmerston North 4440
President	Richard Prior ZL2KP
Vice President	Chester Clark ZL2AFJ
Secretary	Cheryl Wheatley ZL2VCC
Treasurer	Pete Moore ZL2AUB
Net Info	3570 kHz on Sundays at 0900 hours and 147.125 MHz on Thursdays at 2000 hours
Contact Person(s)	Stan Russell ZL2BRS
Contact Ph No	(06) 358-6683 or Email: stanruss@inspire.net.nz
Meeting Info	First Wednesday each month at 1930 hours, fourth Wednesday 1400 for "Old Timers Social "natta session" between March and October.
Committee Meeting	Third Wednesday at 1930 hours
Web	http://zl2ko.org.nz/

21 Manukau

Branch Call-sign	ZL1QB
Physical Address	8 Guide Place, Papatoetoe, Manukau 2025
Postal Address	8 Guide Place, Papatoetoe, Manukau 2025
President	Jim Paltridge ZL1JW
Secretary	Terry Rist ZL1TR
Net Info	3655 kHz and 146.550 MHz on Sundays at 0900 hours
Contact Person(s)	Terry Rist ZL1TR
Contact Ph No	(09) 259-9677
E-mail	risty@vodafone.co.nz
Meeting Info	Third Wednesday each month at 1930 hours. Day meeting first Monday each month at 1015 hours.
Committee Meeting	Combined with General Meeting

22 Marlborough Amateur Radio Club (Inc)

Branch Call-sign	ZL2KS
Physical Address	Marlborough EOC, Wither Road (West Extension) Bleinheim
Postal Address	PO Box 432, Blenheim 7315
President	Stuart Watchman ZL2TW
Secretary	Tony Allan ZL2DOG
Net Info	Blenheim 146.950, 145.600 and 147.225 on Mondays at 1930 hours, 144.150 USB on Wednesdays at 1930 hours and 3.575 MHz on Fridays at 1930 hours
Contact Person(s)	Tony Allan ZL2DOG
Contact Ph No	(03) 579-3136
E-mail	zl2ks@nzart.org.nz
Meeting Info	Second Thursday of each month, Social Group third Thursday of each month
Committee Meeting	Third Thursday of each month
Web	www.zl2ks.com

23 Marton and Districts (Inc)

Branch Call-sign	ZL2AMS
Physical Address	7A Humphrey St., Marton 4710
Postal Address	7A Humphrey St., Marton 4710
President	Mike Beer ZL2TMB
Secretary	Joe Reed ZL2AH
Net Info	Taihape 6775 repeater on Sundays at 2000 hours
Contact Person(s)	Mike Beer ZL2TMB
Contact Ph No	(06) 327-6611
Meeting Info	At members homes. Contact secretary for details

24 Motueka (Inc)

Branch Call-sign	ZL2GK
Physical Address	S.A.R. room, Motueka Police Station, High Street
Postal Address	PO Box 218, Motueka 7143
President	Barry Davenport ZL2LN
Vice President	Steve Fogerty ZL2ASF
Secretary	Doug Anderson ZL2DJA
Treasurer	Doug Anderson ZL2DJA
Contact Person(s)	Steve Fogerty ZL2ASF
Contact Ph No	(03) 528-9366
Meeting Info	First Monday each month 1930 hours at SAR room, Motueka Police Station (Check with contact person)

25 Napier Amateur Radio Club (Inc)

Branch Call-sign	ZL2GT
Physical Address	123 Latham Street, Marewa, Napier 4001
Postal Address	54A Auckland Road, Greenmeadows, Napier 4112
President	Laurie Winton ZL2TC
Secretary	Stan White ZL2ST
Net Info	3615 kHz and Napier 7250 on Sundays at 0900 hours.
Contact Person(s)	Laurie Winton ZL2TC
Contact Ph No	(06) 843-8519
Meeting Info	First Wednesday each month at 1930 hours at Clubrooms (except January)

26 Nelson Amateur Radio Club

Branch Call-sign	ZL2ARG
Postal Address	PO Box 414, Nelson 7040
President	Brian Houghton ZL3BCO (03) 545-7096
Vice President	Paul Moffatt ZL2PO (03) 545 -0962
Secretary	Peter Thomson ZL2PHS (03) 547 0066 Email: phsam@ihug.co.n
Treasurer	Peter Thomson ZL2PHS (03) 547 0066 Email: phsam@ihug.co.n
Net Info	Sundays 3890 kHz at 0900 hours
Contact Person(s)	Brian Houghton ZL3BCO E-mail: zl3bco@gmail.com David Scott ZL2BCA E-mail nelsonsound@xtra.co.nz
Contact Ph No	Brian (03) 545-7096 / David (03) 545-0237 Section Leader
Meeting Info	Third Wednesday (Feb to Nov) at 1930 hours in the Nelson Car Club rooms, Bolt Road, Tahunanui, Nelson
Committee Meeting	First Wednesday of the month. Venue: Committee Members Homes
Web	http://www.nzart.org.nz/nzart/branches/nelson/About_us.htm
General Info	Enquiries about amateur radio examinations and assistance with tuition call Dave ZL2BCA or Topsy ZL2LS (03)545 0237 or David Cell 027 446 4714. Topsy Cell 0274 851 295 E-mail: nelsonsound@xtra.co.nz

27 New Plymouth Amateur Radio Club (Inc)

Branch Call-sign	ZL2AB
Physical Address	Taranaki Emergency Management Office, 45 Robe Street, New Plymouth
Postal Address	C/- Taranaki Emergency Management Office, 45 Robe Street, New Plymouth 4310
President	Frank Hunt ZL2BR
Vice President	Greg Banks ZL2BZH
Secretary	Graeme Jury ZL2APV
Treasurer	Barrie Vivian ZL2LA
Net Info	Wednesday at 2000 hours on 147.200 MHz repeater
Contact Person(s)	Greg Banks (06) 751-3271 or Roy Symon
E-mail	zl2kh@xtra.co.nz
Contact Ph No	(06) 751-3271
Meeting Info	Third Tuesday (February to November) second Tuesday in December

28 Whangarei Amateur Radio Club (Inc)

Branch Call-sign	ZL1AM
Physical Address	Kiwi North, 500 State Highway 14, Maunu, Whangarei
Postal Address	PO Box 10-078, Te Mai, Whangarei 0143
President	Brian Winger ZL1BSW
Secretary	Allan Walker ZL1AW
Net Info	VHF 146.650 MHz on Mondays at 2000 hours. HF 3585 kHz on Sundays at 0800 hours. CW Improvers: 3580 kHz on Tuesdays at 2000.
Contact Person(s)	Allan Walker ZL1AW
Contact Ph No	(09) 435-1413
E-mail	abwalker@actrix.co.nz
Meeting Info	First Wednesday each month at 1930 hours. Informal gatherings at the clubroom every Wednesday at 1700 hours

29 North Shore Amateur Radio Club (Inc)

Branch Call-sign	ZL1AB
Physical Address	Civil Defence HQ, 400 East Coast Road, Sunnynook, North Shore
Postal Address	CD HQ, 400 East Coast Road, Sunnynook, North Shore 0630
President	Vaughan Henderson ZL1TGC
Vice President	Julian Dukes ZL1ABX
Secretary	Alan Wooller ZL1AUW
Treasurer	Mike Cumin ZL1CCD
Net Info	147.425 MHz on Wednesdays at 1930 hours
Contact Person(s)	Vaughan Henderson ZL1TGC
Contact Ph No	(09) 418-1071, E-mail: vaughanh@ww.co.nz .
Meeting Info	First Monday in the month (except June–2nd Monday).
Committee Meeting	3rd Monday in the month (except December)
Web	http://www.zl1ab.110mb.com/

30 Otago (Inc)

Branch Call-sign	ZL4AA
Physical Address	109 Macandrew Road, South Dunedin, Dunedin
Postal Address	PO Box 5485, Moray Place, Dunedin 9058
President	Alan Wilden ZL4FM
Secretary	Dave Howell ZL4TAQ
Net Info	Dunedin 690 each Sunday at 1930 hours (except Christmas/New Year period), 3613kHz each Sunday at 2000 hours.
Contact Person(s)	Dave Howell ZL4TAQ
Contact Ph No	(03) 488-5488
E-mail	davanniehowell@xtra.co.nz
Meeting Info	Each Wednesday (except late December and early January) at 1930 hours
Committee Meeting	Second Wednesday of the month at 1930 hours
Web	www.zl4aa.org.nz
General Info	Inaugural meeting 9th August 1928

31 Pahiatua

Branch Call-sign	In Recess, refer to Branch 06

32 Rahotu Coastal Inc Opunake Radio Club

Branch Call-sign	In recess, absorbed into South Taranaki, Branch 87

33 Rotorua Amateur Radio Club (Inc)

Branch Call-sign	ZL1ROT
Physical Address	Rotorua Watersports Centre, 1 Mataiwhera Street, Rotorua 3010
Postal Address	PO Box 6194, Whakarewarewa, Rotorua 3043
President	Rene de Wit ZL1RDW
Secretary	James Comber ZL1BWC
Treasurer	Margaret Bretherton ZL1MB
Contact Person(s)	James Comber ZL1BWC
Contact Ph No	(07) 347-8265
Email	james.comber@slingshot.co.nz
Meeting Info	General Meeting 3rd Tuesday each month, Technical Meeting 1st Tuesday each month at 1930 hours

34 South Canterbury

Branch Call-sign	ZL3UR
Physical Address	Model Engineers clubrooms, corner Rose and Catherine Streets, Timaru
Postal Address	C/- PO Box 261 Timaru
President	James O'Hare ZL3JH
Secretary	David Hetherington ZL3UDH
Net Info	Timaru 6625 on Wednesdays at 1500 hours
Contact Person(s)	David Hetherington ZL3UDH
Contact Ph No	(03) 688-3619
E-mail	zl3udh@nzart.org.nz
Meeting Info	Last Monday of each month (except December) at 1930 hours

35 South Otago

Branch Call-sign	ZL4JF
Physical Address	Main South Road, Balclutha.
Postal Address	C/- Cliff Gray, Stony Creek RD 2, Balclutha 9272
President	Ron Blair ZL4TL
Secretary	Cliff Gray ZL4AS
Net Info	3585 kHz on Mondays at 2030 hours and Kuriwao 675 on Mondays at 1930 hours
Contact Person(s)	Cliff Gray ZL4AS
E-mail	zl4as@nzart.org.nz
Contact Ph No	(03) 418-1488
Meeting Info	First Tuesday of even months, plus March and November at 2000 hours

36 South Westland

Branch Call-sign	In recess

37 New Zealand Association of Radio Transmitters Southland (Inc)

Branch Call-sign	ZL4GQ
Physical Address	249 Ettrick Street, Invercargill
Phone	(03) 218-8686
Postal Address	PO Box 1260, Invercargill 9840
President	Bill Obers ZL3TPE
Secretary	Michael Bailey ZL4OM
Treasurer	John Willoughby ZL4FV
Net Info	145.775MHz and 146.800MHz on Sunday at 2000 hours
Contact Person(s)	Bill Obers ZL3TPE
Contact Ph No	(03) 215-9765 or (027) 432-1776
E-mail	president@zl4gq.com
Meeting Info	Second Tuesday of each month (except January) at 1930 hours
General Info	AREC Meeting 1st Tuesday of each month at 1930 hours

38 Taumarunui

Branch Call-sign	In Recess

39 Tauranga Districts Amateur Radio Club (Inc)

Branch Call-sign	ZL1TP
Physical Address	Tauranga Coast Guard HQ, Sulphur Point Marina, Tauranga
Postal Address	223C Waihi Rd, Tauranga 3110
President	Neill Ellis ZL1TAJ
Vice President	Brian Heywood ZL1IE
Secretary	Tim Morris ZL1BJJ (07) 577-6845 E-mail: zl1bjj@hotmail.com
Treasurer	Tim Morris ZL1BJJ
Net Info	438.850 MHz on Monday at 0900 hours.
Contact Person(s)	Brian Heywood ZL1IE
Contact Ph No	(07) 543-3677
E-mail	zl1ie@nzart.org.nz
Meeting Info	Second Thursday each month (except January) at 1930 hours at Coast Guard Headquarters
General Info	Repeaters on 680 & 885

40 Te Awamutu Amateur Radio Club

Branch Call-sign	ZL1CB
Physical Address	550 Kane St., Pirongia 3802
Postal Address	C/- 550 Kane St., Pirongia 3802
President	Bernard Westerbaan ZL1WT, 38 Whittaker Street, Kihikihi 3800
Secretary	Biny Owen ZL2AZY, 550 Kane St, Pirongia 3802
Net Info	3760+/- kHz on Thursdays at 2000 hours
Contact Person(s)	Bernard Westerbaan ZL1WT or Biny Owen ZL2AZY
Contact Ph No	(07) 871-7039 or (07) 871-9992
Email	zl1wt@xtra.co.nz
Meeting Info	Third Wednesday every 2nd month

41 Thames

Branch Call-sign	ZL1DF
Physical Address	146 Maramarahi Road, RD1, Thames
Postal Address	146 Maramarahi Road, RD1, Thames
President	Ken Hayhurst ZL1ATU
Vice President	John Halden ZL1ALA
Secretary	David Kitchen ZL1CDJ
Net Info	3850kHz and 145.700 MHz on Sundays at 0900 hours.
Contact Person(s)	Ken Hayhurst ZL1ATU
Contact Ph No	(07) 868-7330
E-mail	k.hayhurst@xtra.co.nz
Meeting Info	Quarterly 2nd Tuesday (February, May, August, and November) at Thames Civil Defence Rooms, Mackey Street, Thames

42 Titahi Bay Amateur Radio Club (Inc)

Branch Call-sign	ZL2AFV
Physical Address	Tireti Hall, corner Tireti Road and TePene Avenue, Titahi
Postal Address	PO Box 50-402, Porirua 5240
President	Ken Pattle ZL2TKY
Secretary	Don Robertson ZL2TYR
Treasurer	Ross Pedder ZL2UAC
Net Info	3710 kHz on Sundays at 2000 hours
Contact Person(s)	Don Robertson ZL2TYR
Contact Ph No	(04) 234-1556
E-mail	zl2afv@hotmail.com
Meeting Info	First Tuesday most months at 1930 hours, (ring contact to check)
Committee Meeting	February and July

43 Waihi and Districts

Branch Call-sign	ZL1QW
Postal Address	Mr D McGuire, 14 Snell Crescent, Waihi Beach 3611
President	E. A. Pooley ZL1KV
Vice President	R J Boggiss ZL1RB
Secretary	D. McGuire ZL3DM
Treasurer	D. McGuire ZL3DM
Contact Person(s)	D. McGuire ZL3DM
Contact Ph No	(07) 863-5484
Meeting Info	First Saturday, February, April,May, July,Sept, Nov. at 1230 hrs for lunch, meeting at 1300. Ring Secretary for location

44 Matamata Radio Club

Branch Call-sign	ZL1RF
Physical Address	65 Smith Street, Matamata
Postal Address	65 Smith Street, Matamata 3400
Contact Person(s)	John Rasmussen ZL1AGA
Contact Ph No	(07) 888-8269 (Night)

45 Waimarino

Branch Call-sign	In recess

46 Wairarapa Amateur Radio Club (Inc)

Branch Call-sign	ZL2OA
Physical Address	Hood Aerodrome, Manaia Road, Masterton
Postal Address	PO Box 860, Masterton 5840
President	Robert Lambert ZL2BFY
Secretary	Paul London ZL2BEF
Net Info	Masterton 680 on Mondays at 2000 hours except meeting nights
Contact Person(s)	Paul London ZL2BEF
Contact Ph No	(06) 378-2388
E-mail	branch46@gmail.com
Meeting Info	Second Monday each month (except January) at 1930 hours

47 Waitara Amateur Radio Club

Branch Call-sign	ZL2TO
Physical Address	Manukorihi Park Sports Club, Manukorihi Road, Waitara
Postal Address	C/- L Smart 48 Leslie St., Waitara 4656
President	Ian Cash ZL2BRA
Secretary	Larry Smart ZL2SM
Contact Person(s)	Larry Smart ZL2SM
Contact Ph No	(06) 754-7583
Meeting Info	First Sunday each month (except January). Where a Statutory Holiday falls on a Monday the meeting is deferred one week

48 Wanganui Amateur Radio Society (Inc)

Branch Call-sign	ZL2JA
Physical Address	Stalkers and Hunters Hall, 100 Peat Street, Wanganui
Postal Address	1 Caversham Rd., Westmere, Wanganui 4501
President	Ivan Horn ZL2ATU
Secretary	Barry Stewart ZL2RR
Treasurer	Barry Stewart ZL2RR
Net Info	Each Tuesday 2000 hours on 146.900 MHz (Wanganui 690)
Contact Person(s)	Ivan Horn ZL2ATU
Contact Ph No	(06) 343 6979
E-mail	loobie@kol.co.nz
Meeting Info	First non-public holiday Monday each month (except January and July) at 1930 hours

49 Westland

Branch Call-sign	ZL3GY
Postal Address	37 Chapel Street, Greymouth
President	Bob McQuarrie ZL3TY
Secretary	Graham Hay ZL3WMM
Net Info	Westland 695 to contact club members
Contact Person(s)	Graham Hay ZL3WMM
Contact Ph No	(03) 768-9499
E-mail	zl3wmm@nzart.org.nz
Meeting Info	First Wednesday each month (except January) at 1930 hours. Meeting held at Electronet Services, Tainui St. Building, Greymouth

50 Wellington Amateur Radio Club (Inc)

Branch Call-sign	ZL2WB
Physical Address	WEMO Building, corner Murphy and Turnbull Streets, Thorndon, Wellington
Postal Address	PO Box 6464, Marion Square, Wellington 6035
President	Chairman: David Parisch ZL4TAC
Secretary	John Andrews ZL2HD
Treasurer	Andrew Goldie ZL2ACG
Net Info	7050 kHz on Sundays at 0930 hours
Contact Person(s)	Tony Fletcher ZL2ALJ
Contact Ph No	(04) 383-8838
E-mail	zl2alj@paradise.net.nz
Meeting Info	Third Tuesday each month (except December) at 1930 hours
Web	sites.google.com/site/warc50
General Info	Information on Quartz Hill Contest Station ZL6QH see www.zl6qh.com

51 Eastern Bay of Plenty

Branch Call-sign	ZL1WK
Physical Address	Waiewe Street, Hillcrest, Whakatane
Postal Address	C/- Bevan Schwass, 24 Mokorua Grove, Whakatane 3120
President	Murray Evans ZL1SZ
Secretary	Bevan Schwass ZL1MJ
Treasurer	Harry C Webber ZL1BCW
Contact Person(s)	Murray Evans ZL1SZ.
Contact Ph No	(07) 308-8409
E-mail	BevanSchwass@xtra.co.nz
Meeting Info	Second Wednesday each month (except January) at 1930 hours
Web	http://www.zl1wk.yolasite.com/

52 Northern Hawkes Bay

Branch Call-sign	In recess

53 Te Puke Amateur Radio Club (Inc)

Branch Call-sign	ZL1IB
Physical Address	C/- Te Puke Holiday Park, 2122 State Highway 2, Te Puke
Postal Address	C/- S.J. Rowe, 223 State Highway 33, RD 9, Te Puke 3189
President	Neill Ellis ZL1TAJ
Secretary	Syd Rowe ZL1LWR
Treasurer	Syd Rowe ZL1LWR
Net Info	3690 kHz at 0830 hours on Sundays, 144.715MHz and 438.850 MHz on Mondays at 0900 hours
Contact Person(s)	Syd Rowe
Contact Ph No	(07) 533-1029
Email	syd.rowe@xtra.co.nz
Meeting Info	2nd Saturday each month at 1330 hours
General Info	Clubrooms open every Saturday at 1330 hours

54 Patea

Branch Call-sign	In recess, absorbed into South Taranaki, Branch 87

55 Waitomo Radio Club

Branch Call-sign	ZL1IZ
Physical Address	Thomson Avenue, Otorohanga
Postal Address	C/- 3/49 Hinewai Street, Otorohanga 3900
President	Andrew Leadey ZL4SQ
Secretary	Ihian Howitt ZL1BZ
Net Info	Waitomo 7375 on Sundays at 0900 hours
Contact Person(s)	Ihian Howitt ZL1BZ
Contact Ph No	(07) 873-7349
E-mail	ihian@clear.net.nz
Meeting Info	At members homes, contact Secretary for details

56 Christchurch West Amateur Radio Club (Inc)

Branch Call-sign	ZL3VV
Physical Address	Auburn Park, Upper Riccarton
Postal Address	C/- PO Box 31-095, Ilam, Christchurch 8444
President	Keith Stanton ZL3QH
Vice President	Maurice McNab ZL3MEM
Secretary	Doug Pratt ZL2BCF
Treasurer	Peter Tyerman ZL3IA
Net Info	Cass Peak 145.625MHz linked to Tekapo 146.800MHz on Sundays at 2000 hours (except delayed last Sunday of the month after Official Broadcast)
Contact Person(s)	John Walker ZL3IB
Contact Ph No	(03) 348-9084
E-mail	john.zl3ib@ihug.co.nz
Meeting Info	Fourth Tuesday of each month (except December) at 1930 hours. "Free n Easy" second Wednesday each month (except January) at 1330 hours
Committee Meeting	3rd Tuesday of each month at 1930 hours
Web	www.radioamateurs.org.nz

57 Tokoroa

Branch Call-sign	In recess

58 Helensville

Branch Call-sign	In recess

59 Mangakino

Branch Call-sign	In recess

60 Taupo Amateur Radio Club

Branch Call-sign	ZL1BCO
Physical Address	Hickling Park, A.C. Baths Avenue, Taupo
Postal Address	C/- PO Box 58, Taupo 3351
President	Kelvin Brooking ZL1KU
Vice President	Roger Simmonds ZL1UTW
Secretary	Graeme Frederick ZL1BU
Treasurer	Peter Aurisch ZL2UEW
Net Info	Taupo 675 on Mondays at 2000 hours
Contact Person(s)	Graeme Frederick ZL1BU
Contact Ph No	(07) 378-0553. Cell 021 295 6023
E-mail	zl1bu@reap.org.nz
Meeting Info	First Thursday of each month at 1930 hours at Club Rooms
Web	www.reap.org.nz/~zl1bco/

61 Central Otago

Branch Call-sign	ZL4OO
Physical Address	Alexandra Fire Station
Postal Address	C/- Brian Skeet, 329 Dunstan Road, 1 RD, Alexandra 9391
President	John Lochhead ZL4QS
Secretary	Brian Skeet ZL4PN
Contact Person(s)	Brian Skeet ZL4PN
Contact Ph No	(03) 448-7245
Meeting Info	Fourth Thursday each month (except June, July and December) at 2000 hours at Alexandra Fire Station

62 Reefton-Buller

Branch Call-sign	ZL3BRC
Postal Address	33 Torea St., Granity 7823
Secretary	Ron Jenkins ZL3AWX
Contact Person(s)	Ron Jenkins ZL3AWX
Contact Ph No	(03) 782-8672
Meeting Info	2 monthly meeting–telephone Contact Person for date and venue

63 Upper Hutt (Inc)

Branch Call-sign	ZL2VH
Physical Address	Rural Fire Station, Park Street, Upper Hutt
Postal Address	c/o Peter Moore, 190 Plateau Road, The Plateau, Upper Hutt 5018
President	Mark Gooding ZL2UFI
Vice President	Mark Wolstenholme ZL2WOL
Secretary	Peter Moore ZL2HM
Treasurer	Gavin Smith ZL2ACT
Net Info	3715 kHz Tuesdays 2000 hours UTC
Contact Person(s)	Mark Gooding ZL2UFI
Contact Ph No	(04) 526-8446
E-mail	mark@foxtrot.co.nz
Meeting Info	Every Friday night at 1930 hours NZT
Committee Meeting	As required
Web	www.zl2vh.org.nz
General Info	IRLP Node 6931 on Climie 730, IRLP Node 6962 on Climie 860

64 North Otago

Branch Call-sign	ZL4OU
Physical Address	Civil Defence Headquarters, Severn Street, Oamaru
Postal Address	Branch 64, 18A Arun Street, Oamaru 9400
President	Neil McLeod ZL4SN
Vice President	Daniel Lewis ZL4DL
Secretary	Gary Millar ZL4TA
Treasurer	Denis Browne ZL4DB
Net Info	3890 kHz Wednesdays at 2000 hours
Contact Person(s)	Alan Naish ZL4RB
Contact Ph No	(03) 434-6363
E-mail	naishs@callsouth.net.nz
Meeting Info	Second Monday each month (except January) at 1930 hours, Civil Defence Headquarters, Severn Street
General Info	Repeater Trustees: Neil McLeod, Denis Browne ,Daniel Lewis.

65 Papakura Radio Club (Inc)

Branch Call-sign	ZL1VK
Physical Address	Wellington Park, 1R Great South Road, Papakura
Postal Address	PO Box 72397, Papakura 2244
President	David Karrasch ZL1DK
Vice President	Fred Vermeulen ZL1FAV
Secretary	Ian Ashley ZL1AOX
Treasurer	David Wilkins ZL1MR
Net Info	147.325 MHz on Sundays at 0830 hours and 3755 kHz on Sundays at 0900 hours
Contact Person(s)	David Karrasch ZL1DK
Contact Ph No	(09) 296-3180 or (09) 296-8264
E-mail	prc@ihug.co.nz
Meeting Info	General Meeting first Wednesday each month at 1930 hours. Projects evening second & fourth Wednesday at 1930 hours. Day meeting fourth Wednesday at 1330 hours. Any 5th Wednesday AREC meeting on any 5th Wednesday at 1930
Committee Meeting	Third Wednesday of each month at 1930.
Web	www.qsl.net/zl1vk. Remote HF Station ZL1CLUB www.qsl.net/zl1club
General Info	Morse Examination administrator: Dave Johnston ZL1AMN (09) 298-9297

66 Auckland VHF Group (Inc)

Branch Call-sign	ZL1BQ
Physical Address	Arthur Faulkner Reserve, Hazel Avenue, Mt Roskill, Auckland
Postal Address	AKL VHF Group Inc, PO Box 10138, Dominion Road, Auckland 1030
President	John Dunn ZL1JD
Vice President	Jim Meachen ZL2BHF
Secretary	Marlene Mathews
Treasurer	Doug Cooke ZL1TTE
Net Info	146.625 and 439.875 repeaters, Sundays 2015 hours
Contact Person(s)	John Dunn ZL1JD
Contact Ph No	(09) 473-9514
Email	john.dunn@clear.net.nz
Meeting Info	Second Monday of the month at 1930 hours
Committee Meeting	Last Monday of the month, 1930 hours at the clubrooms. AGM November
Web	www.qsl.net/zl1bq
General Info	Monthly Journal: Spectrum

67 Kawerau Amateur Radio Club

Branch Call-sign	ZL1KW
Physical Address	Meetings held in members homes, confirm venue with Secretary
Postal Address	C/- 34 Cobham Drive, Kawerau 3127
President	Barry Liddle ZL1CAY
Secretary	Bev Osborne ZL1OS
Net Info	147.900MHz every Tuesday at 1930 hours
Contact Person(s)	Bob Krause ZL1TMK
Contact Ph No	(07) 323-8560
E-mail	rkrause@xtra.co.nz
Meeting Info	Third Tuesday each month in members homes at 1930 hours. Confirm venue with Secretary at (07) 323-7515

68 North Canterbury Amateur Radio Club (Inc)

Branch Call-sign	ZL3RR
Physical Address	Woodend Lions Youth Centre
Postal Address	PO Box 14, Woodend 7641, North Canterbury
President	Tony Buckland ZL3HAM
Secretary	Colin Rowe ZL3COL
Net Info	Cass Peak 145.625MHz linked to Tekapo 146.800MHz on Sundays at 2000 hours (except delayed last Sunday of the month after Official Broadcast)
Contact Person(s)	Colin Rowe ZL3COL
Contact Ph No	(03) 313-2303
E-mail	colingr@xtra.co.nz
Meeting Info	Second Thursday of each month (except January) at 1930 hours
General Info	Monthly Newsletter: "Ragchew"

69 Kapiti Amateur Radio Society (Inc)

Branch Call-sign	ZL2KB
Physical Address	Cnr Aorangi Road and Tutanekai Street, Paraparaumu
Postal Address	PO Box 81, Paraparaumu 5254
President	Max Kempson ZL4VV
Vice President	Kevin Henderson ZL2DUS
Secretary	Dave Chapman ZL2DWC
Treasurer	Dave Chapman ZL2DWC
Net Info	Kapiti 146.85 MHz on Sundays at 1930 hours.
Contact Person(s)	Dave Chapman ZL2DWC
Contact Ph No	(04) 298-7252 or mobile (027) 443-3095
E-mail	dave@kennel.co.nz
Meeting Info	Second Wednesday each month at 1930 hours. Clubrooms open every Saturday from 0930 hours until 1030 hours.
Committee Meeting	Third Wednesday at 1930 hours
General Info	Very small group of active amateurs, always pleased to meet other operators even if no longer transmitting. There is always a cuppa available on Saturday morning at the clubrooms. If travelling to or staying on the coast, let Dave know, we will meet you.

70 Fielding Radio Club

Branch Call-sign	In recess

71 Rodney Amateur Radio Club (Inc)

Branch Call-sign	ZL1ROD
Physical Address	Mahurangi Technical Institute,11 Glenmore Drive, Warkworth
Postal Address	PO Box 587 Warkworth 0941
President	Cec Tunnicliffe ZL2BCB
Secretary	Alan Dale ZL1ABL
Net Info	VHF 147.300 MHz Thursdays at 1930 hours
Contact Person(s)	Cec Tunnicliffe ZL2BCB
Contact Ph No	(09) 425-4295
Meeting Info	Second Saturday each month at 1000 hours (except December First Saturday, January no meeting) at the Mahurangi Technical Institute

72 Opotiki Amateur Radio Club (Inc)

Branch Call-sign	ZL1BY
Postal Address	C/- 138 Wellington Street, Opotiki 3092
President	Jim Jones ZL1JRJ
Secretary	Jane Lake ZL1ONE
Contact Person(s)	Steve Winder ZL1ACE
Contact Ph No	(07) 315-7333
E-mail	zl1ace@wave.co.nz
Meeting Info	Bi-monthly first Monday (March, May, July, September and November) at1900 hours at the rear of St Stephen's Church.

73 Northern Wairoa Electronics Club

Branch Call-sign	In Recess
Contact Person(s)	Peter Aikin ZL1TX

74 Wellington VHF Group (Inc)

Branch Call-sign	ZL2WA
Physical Address	Tawa Community Centre, Cambridge Street, Tawa
Postal Address	PO Box 12 -259, Thorndon, Wellington 6144
President	Dick Greenbank ZL2TGQ
Secretary	Rob Wallace ZL2WAL
Net Info	710 repeater on Wednesdays at 2000 hours
Contact Person(s)	Rob Wallace ZL2WAL
Contact Ph No	(04) 972-5571. E-mail: zl2wa@clear.net.nz
Meeting Info	Last Thursday each month (except December) at 1945 hours

75 Queenstown

Branch Call-sign	In recess

76 Kaikoura

Branch Call-sign	In Recess

77 Te Aroha and Districts Radio Club

Branch Call-sign	In recess

78 Far North Districts Amateur Radio Club (Inc)

Branch Call-sign	ZL1FND
Physical Address	Queen St, Awanui
Postal Address	PO Box 4, Awanui 0441
President	Bob Banks ZL1AUI
Secretary	Russell Shackleton ZL1BQK
Net Info	Far North 710 on Mondays at 1900 hours.
Contact Person(s)	Eric Manning ZL1GE.
Contact Ph No	(09) 406-7059
E-mail	rshack@xtra.co.nz
Meeting Info	Meetings held as required

79 Howick and Districts Radio Club

Branch Call-sign	In recess

80 Hibiscus Coast Radio Society (Inc)

Branch Call-sign	ZL1HCR & ZL1FU
Physical Address	479/1 Whangaparaoa Road, Whangaparaoa 0932
Postal Address	479/1 Whangaparaoa Road, Whangaparaoa 0932
Secretary	Geoff Hayes ZL1UKB, Telephone (09) 426 4285
Treasurer	Geof Hayes ZL1UKB
Net Info	3810 kHz on Sundays at 0800 hours. 147.300 MHz repeater with Branch 71 Thursdays at 1930 hours
Contact Person(s)	Geoff Hayes ZL1UKB or Fred Kennedy ZL1BYP
Contact Ph No	(09) 424 2771
E-mail	radioclub80@kol.co.nz
Meeting Info	Third Wednesday even months at 1930 , third Saturday odd months at 0930
Committee Meeting	Second Tuesday each month
General Info	AGM second Wednesday in December at 1930 hours

81 Waikato VHF Group (Inc)

Branch Call-sign	ZL1IS
Physical Address	C/- 64 Sunnyhills Avenue, Glenview, Hamilton, 3206
Postal Address	PO Box 606, Waikato Mail Centre, Hamilton, 3240
President	Alan Wallace ZL1AMW
Secretary	Gavin Petrie ZL1GWP
Net Info	Waikato 695 on Sundays at 2045
Contact Person(s)	Gavin Petrie ZL1GWP
Contact Ph No	(07) 843-0326
E-mail	zl1gwp@nzart.org.nz
Meeting Info	Last Sunday (February, May, August and November) at 1330 hours, listen to Sunday Net or visit website for details.

82 Southern Wairarapa Amateur Radio Club

Branch Call-sign	ZL2SWR
Physical Address	St Johns Hall, Featherston
Postal Address	38 Bell St, Featherston
President	Neil Rait ZL2BLM
Secretary	Peter Norden ZL2SJ
Contact Person(s)	Peter Norden ZL2SJ
Contact Ph No	(06) 308-6970
E-mail	zl2sj@nzart.org.nz

83 Raglan Amateur Radio Club

Branch Call-sign	ZL1CCT
Physical Address	25 Bay View Road, Raglan
Postal Address	25 Bay View Road, Raglan 2051
Secretary	Fred Gilbert ZL1FG
Net Info	Saturdays 3608 kHz at 0830 hours, 7088 if conditions dictate.
Contact Person(s)	Fred Gilbert
Contact Ph No	(07) 825-8018
E-mail	zl1fg@ihug.co.nz

84 Bay of Islands Amateur Radio Club (Inc)

Branch Call-sign	ZL1BOI
Physical Address	Rainbow Falls Road, RD2, Kerikeri
Postal Address	63 Signals Road RD 1 Okaihau 0455
President	I. Wilson ZL1CBD
Vice President	D. Cottle ZL1HH
Secretary	N. Wallace ZL1IU
Contact Person(s)	D. Cottle ZL1HH or N. Wallace ZL1IU
Contact Ph No	Don Cottle (09) 407-9086, E-mail donc@xtra.co.nz or Nick Wallace (09) 401-9042, E-mail zl1iu@xtra.co.nz
Meeting Info	Meetings are held as required

85 Mercury Bay

Branch Call-sign	In Recess

86 Suburban Amateur Radio Club (Inc)

Branch Call-sign	ZL1ZLD, ZL1ZLF
Physical Address	Musick Memorial Radio Station, 20 Musick Point Road, Bucklands Beach, Auckland
Postal Address	C/- PO Box 163060, Lynfield, Auckland 1443
President	Chairman Ian Walker ZL1BFB
Secretary	Ann Walker ZL1TRH
Contact Person(s)	Ian Walker ZL1BFB
Contact Ph No	(09) 626-7188 or Mobile 027 441-1820
E-mail	zl1bfb@xtra.co.nz
Meeting Info	Second Sunday each month 1300 hours. Midweek group each Wednesday at 1000 to 1500 hours.

87 South Taranaki Amateur Radio Club (Inc)

Branch Call-sign	ZL2QF
Physical Address	c/o Storage 411 Union St., Hawera
Postal Address	PO Box 156, Hawera 4640
President	Graeme Blyde ZL2UFN
Secretary	Alistair Tong ZL2ALT
Treasurer	Michael Mulholland ZL2WJM
Net Info	705 repeater on Sundays 2000 hours
Contact Person(s)	Alistair Tong ZL2ALT
Contact Ph No	(06) 278 4652
E-mail	jandaton@inspire.net.nz
Meeting Info	4th Monday of each month (except January) at 1930 hours at the Club rooms–Storage 411. Some meetings are held at alternative venues, check with secretary.
Web	http://www.qsl/net/ZL2QF

88 Tauranga Emergency Communications Group

Branch Call-sign	ZL1TEC
Physical Address	Emergency Management Office, WBOPDC, Barkes Corner, Tauranga 3112
Postal Address	5 Graham Place, Bellevue, Tauranga 3110
President	Brian Heywood ZL1IE
Vice President	Don Spackman ZL1MK
Secretary	Gordon Cooper ZL1KL
Treasurer	Bill Richardson ZL1APD
Net Info	Tauranga 680 repeater, Wednesdays at 2030 hours (combined branches net)
Contact Person(s)	Brian Heywood ZL1IE
Contact Ph No	(07) 543-3677
E-mail	brian@eol.co.nz
Meeting Info	Third Thursday of each month, except December, 1930 hours at the clubrooms, EMO Office, Barkes Corner.
Committee Meeting	Combined with Branch Meeting

(Affiliated) Canterbury Amateur Radio Development Society (Inc). (CARDS)

Branch Call-sign	ZL3CAR
Postal Address	PO Box 21-188, Edgeware, Christchurch 8030
President	Mike Stubberfield ZL3MJS
Vice President	Mike Barnes ZL3TMB
Secretary	Lorna Allan ZL3AAZ
Treasurer	Mark Sullivan ZL3AB
Contact Person(s)	Lorna Allan ZL3AAZ
Contact Ph No	(03) 313-5352
E-mail	lorna.allan@getrheel.co.nz
Meeting Info	Third Wednesday of each month (except January) 1930 hours at the Branch 56 Clubrooms, Auburn Park, Christchurch

SUSTAINING THE AMATEUR SERVICE

A Responsibility for all Radio Amateurs!

The amateur radio qualification is an achievable challenge for most people and is useful to career seekers in our technological world. It shows aptitude, a sincere interest in communications, and identifies an achiever. Which can give a jump over others in this competitive world. The late 1940s was a time with a wave of new entrants into amateur radio. Let us all try to promote a return to that level of interest! The NZART Council encourages newcomers into Amateur Radio. This calls for the help of all radio amateurs. As a challenge to all of us, the NZART Council has adopted the expression, "The New Wave", to embrace initiatives and objectives which will encourage new entrants to the world of amateur radio.

The NZART Constitution in its object statement says: "The objects of the Association shall be the maintenance and expansion of the Amateur Service in New Zealand by:

a) the encouragement of recruits into the Amateur Radio movement
b) the provision of guidance and instruction in radio techniques and operating
c) the promotion organisation and conduct of activities on a national and local basis ...",

These objects are further reflected in wording in the NZART Strategic Plan, in particular Objective 2, which states:

- To promote knowledge of amateur radio and encourage newcomers.
- To assist Branches in local activities, especially in schools.
- To provide education and training aids.
- To award suitable prizes and other recognition."

And, in the plans of action:

"To publish information in Break-In, training materials and aids, educational and publicity material."

The NZART Strategic Plan Objective 3 states: "To provide guidance and instruction in radio techniques and operating, and encourage practical experimentation."

With your guidance and your help, others too can experience the thrills of Amateur Radio. Active encouragement and support are sought from all NZART members and Branches to recruit newcomers and to run classes in preparation for the amateur radio examination. Branches are encouraged to actively promote Amateur Radio. Master copies of brochures, posters and other leaflets and publicity material are available to Branches free of charge, from NZART Headquarters.

A sticker is available to NZART members from NZART Headquarters for 50c each. This is for displaying in the rear window of vehicles to show your support in a national campaign to increase the awareness of Amateur Radio in the general population. Many computer users are unaware of amateur radio and what it has to offer. You are encouraged to widely advertise the NZART World Wide Web page, <http://www.nzart.org.nz>

Simple-to-construct equipment is a way to show youth groups and other interested persons the fun of Amateur Radio. Show how inexpensive home-construction brings delight and excitement from the achievement of communicating without wires over long distances using self-built gear. Articles from Break-In may be freely photocopied and distributed for this purpose. Do you know anyone who has shown interest in Amateur Radio? A youth or grandchild perhaps? Spread the word by demonstration! After passing the amateur radio examination, a call-sign that is unique world-wide is issued by the Ministry of Economic Development. The challenge to attain such an identifying callsign brings its own rewarding fun. A local "group project", with the challenge to interest newcomers to develop their own local on-air amateur radio net, is worthy of consideration and encouragement. Construction of receivers, transmitters and other projects under the guidance of experienced constructors at "club workshop nights" is a worthy Branch activity. Each Branch should appoint an "NZART Agent" as one of their executive, the task being to gain increases in NZART members, both Transmitting and Non-Transmitting, in their local areas. A national and concerted effort by all New Zealand Radio Amateurs to promote Amateur Radio is necessary to ensure the continuation of a healthy and vigorous Amateur Service.

Help bring the "The New Wave" of radio amateurs!

THE PROMOTION OF AMATEUR RADIO

Your work promoting AMATEUR RADIO is helped with this new STUDY GUIDE and sample TEST PAPERS

To help interested people become radio amateurs a **Study Guide** and sample **Test Papers** for the New Zealand Amateur Radio Examination are available:

1. The Study Guide and the TEST PAPERS are both available on one CD-ROM, packed in a gift folder, from NZART Headquarters. This is your chance to get computer-literate youngsters interested and involved in Amateur Radio! Send your name and Call-sign with $10 to NZART Headquarters with the name and the address of the person you wish to receive the Study Guide and Test Papers. A CD and gift folder will be posted—with your compliments. You will be named on the gift folder. (Installation instructions are in a .txt file on the CD and printed inside the gift-folder.)

2 The Guide and the Test Papers can also be viewed and used on-line – by anyone. Visit the NZART web page: <http://www.nzart.org.nz/exam/index.html> and follow the links.

3. Both the Guide and the Test Papers can be downloaded in separate self-extracting files for installation on your own computer. Installation details are on the web page <http://www.nzart.org.nz/exam/index.html>. Downloading is recommended, so these documents can be used at any time.

Please Note:

1. These documents can be used as a source of hand-out notes for Instructors at Radio Classes. "Copy and paste" can be used to copy material into a word processor then photocopied for class use, or whole pages can be printed off.
2. The Guide is NOT a replacement for the NZART Basic Radio Training Manual. The two support and complement each other.

New Zealand Amateur Radio Stations Personal Call-signs as at 18 August 2010

The Ministry of Economic Development Radio Spectrum Management (RSM) have provided the following guide to entering your personal details:

There are discrepancies in the addresses recorded, as such some have part of their address not showing up.

When amateur radio operators have updated their record, addresses should be shown as follows:

Address type	Address Residential/Physical	Address Billing/Postal
Address 1:	Street address	PO Box
Address 2:	Town/ suburb	Suburb
Address 3:	City/Region	City/Region
Address 4:	City	City
Area Code:	Area Code	Area code

Not all will complete all fields, but the most specific address should go to Address 1, while the least specific address should be entered into the highest address.

All should update their area code as NZ POST have recently updated this.

Details can be updated either online at:
http://www.rsm.govt.nz/smart
(you will need your log in details)

After logging on
>Select 'Logon Details'
>'Change your Client Details' menu. From here you can change basic information, including your email or by phoning RSM on 0508 776 463.

For Silent Keys, there is a form available at
http://www.nzart.org.nz/policies/2006-call-sign-removal-form.html and shown on the following page.

This can be filled in and posted to the NZART Business Manager at HQ (PO Box 40-525 Upper Hutt 5140) with relevant supporting documentation by a person authorised to do so.

It is recommended that the form be filled out and signed and left with the will, thus removing another job that the next of kin are required to do.

For further information, please see the help files at http://www.nzart.org.nz/call-book/index.html.

Please note that amateur radio operators are using a variety of ways of entering text, either all upper case, all lower case or first letter capitalised. It would be appreciated if text could be entered with the first letter capitalised. It makes the Call-Book Editor and typesetter's work much easier.

The names used in the following call-sign lists are those in the first name, last name fields which are not user editable and not the billing name field.

RSM and NZART have endeavoured to provide as accurate a call-sign list as possible given the difficulties with the removal of silent keys and most of the information being as provided by the user.

The New Zealand Association of Radio Transmitters Incorporated
PO Box 40-525 Upper Hutt

As supplied by the Ministry of Economic Development Radio Spectrum Management on 18 August 2010. NOTE: NZART Councillors, Call-Book Editor, MED or any other person assisting with the production of this document cannot be held responsible for its accuracy. If there are address errors please contact RSM as described above.

Application to remove a Client Record from the Radio Spectrum Management Register

The Radio Spectrum Management Database is a Government register established and maintained under the Radiocommunications Act 1989. A call-sign cannot be removed from the register, or given to a family member who is qualified to hold the call-sign, unless the ARX at NZART receives a direct instruction from a person with authority to make the request.

Please fill in as much of this form as is known and return to NZART at the above address.

I, the undersigned, instruct NZART to action the following call-sign(s) and information in the MED database:

Name: _____

Address: _____

City: _____

Date of Birth: _____

Call-sign(s): _____

Reason for Application: _____

_____

_____

_____

Options: (Please cross out the option that does not apply)

1. I instruct NZART to remove the call-sign(s) ..... from the MED Register. I understand that the call-sign(s) will not be reallocated for a period of 12 months unless I make a direct request for the call-sign(s) to be reallocated to a specific person within this period.
2. I instruct NZART to remove the call-sign(s) ..... from the MED Register. I give my permission to allocate the following call-sign(s) to the following qualified person/people/organisation.

Call-sign Person/Organisation _____

_____

_____

NZART Membership: Please remove the above person from NZART Membership:

NZART Membership Number ..... (If Known)

1. Now: (Break-In delivery will cease ASAP)
2. At the end paid subscription: (Break-In will continue until the subscription expires)

(Please cross out option that does not apply.)

Name: _____ Signature: _____

Relationship to client: Next of Kin / Power of attorney / Executor in Estate / Solicitor acting for Executor

20091117

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CALL-SIGNS

ZL18JOTA	Ms M Smolnicki	19 Oakleigh St, Maungaraki, Lower Hutt 6009
ZL1AAA	Mr B D Gordon	11 Siota Cres, Kohimarama, Auckland
ZL1AAB	Mr D J Cardy	28 City View Tce, Birkenhead, Auckland 10
ZL1AAE	Mr J K Yearsley	Boat Harbour Rd, RD 1, Whitianga
ZL1AAF	Mr R L Walker	128 Buffalo Beach Rd, Whitianga
ZL1AAH	Mr R B Backhouse	17 Dale Rd, Kelys Bay, RD 1, Te Kopuru 0356
ZL1AAI	Mr J W De Jong	28A Richmal St, Waihi 2981, Waikato
ZL1AAJ	Mr H J Williams	30 Halberg St, Glenfield, Auckland 1310
ZL1AAK	Mr C H L Stephens	56 Karaka St, Takapuna
ZL1AAL	Mr A J Carruthers	9A Cockle Bay Rd, Howick
ZL1AAM	Mr P L Scott	25 Chatsworth Cres, Pakuranga
ZL1AAN	Mr H T Falkner	8 Kapai St, Devonport
ZL1AAO	Mr L B Steel	86 Bennett Rd, Te Mata, RD 5, Thames 3575
ZL1AAP	Mrs A A Pope	Address Withheld
ZL1AAQ	Mr W J Palmer	27 Thomas St, Tikipunga, Whangarei 0101
ZL1AAR	Mr R G Rowe	32 Manawa Rd, Remuera
ZL1AAS	Mr A Scott	25A Rodney St, Howick, Auckland
ZL1AAU	Mr C B Elley	Unit 11, Waihi Hosp Retirement Village, Village Way, Waihi
ZL1ABC	Mr R R Biddle	Paerata, Pukekohe 1800
ZL1ABG	Mrs B Garlick	14/1 Cambria St, Nelson
ZL1ABI	Mr H Baer	51/8 Fynn St, Birkdale, Auckland 0632
ZL1ABL	Mr A J Dale	61 Rodney St, Wellsford, Auckland 0900
ZL1ABM	Mr M L G Humphrey	1009 Tararu Rd, Thames
ZL1ABN	Mr M J F Reay	16 Priscilla Cres, Hamilton
ZL1ABP	Mr K L Rutter	55 Ellis Ave, Mt Roskill, Auckland 1004
ZL1ABR	Mr B J Ward	44 Cordyline Rd, RD 5 Tuakau, Port Waikato
ZL1ABS	Mr M J Sheffield	176 Albany Highway, Albany, Auckland
ZL1ABX	Mr J R Dukes	102 Awaruku Rd, Torbay
ZL1ABZ	Mr I Johnson	15 Muirend Ave, Tokoroa
ZL1ACD	Mr A H Coakley	1 Clinton Ave, Te Atatu Peninsula, Auckland 1008
ZL1ACE	Mr S P Winder	138 Wellington St, Opotiki
ZL1ACG	Mr E G Caldwell	23 Clyma Pl, Massey, Auckland 1008
ZL1ACH	Mr R J M Ten Velde	8 Matipo Pl, Tokoroa
ZL1ACJ	Mr R H Turner	7 Keiss St, Blenheim
ZL1ACK	Mr R F Marshall	PO Box 41172, St Lukes, Auckland
ZL1ACM	Mr C J Mckenzie	108 Prices Rd, Wiri, Manuakau, Auckland 2025
ZL1ACN	Mr D L Messent	53 Russell Rd, Huntly
ZL1ACT	Mr R N Miller	72 Grattan Rd, Te Aroha
ZL1ACV	Mr D G L Twiss	Po Box 884, Taupo
ZL1ACW	Mr A William	304A Shoalhaven, 130 Anzac St, Takapuna, North Shore City 0620
ZL1ACX	Mr B W Rous	56 Tamahere Dr, Glenfield
ZL1ACY	Mr C J Billing	16 Dobell Rd, Stanmore Bay, Whangaparaoa 1463
ZL1ACZ	Mr B C Williams	M3 66 Avonleigh Rd, Green Bay, Auckland
ZL1AD	Mr D J Blackett	56 Church St, Northcote, Auckland 9
ZL1ADB	Mr P G E Ataya	4204 Great North Rd, Henderson
ZL1ADC	Mr R G Meharry	111 Clarkin Rd, Fairfield, Hamilton
ZL1ADE	Mr E J Duffy	22 Duke St, Mt Roskill, Auckland
ZL1ADG	Mr C W Hunt	990/1 Bank St, Te Awamutu
ZL1ADI	Mr C A Rademacher	2247 South Head Rd, RD 1, Helensville
ZL1ADL	Mr D N Wilkins	5 Ethel St, Sandringham
ZL1ADO	Mr J K Sullivan	26 Karaka Park Pl, St Heliers, Auckland 1005
ZL1ADP	Mr F J Medland	11 The Lane, Medlands Bay, Great Barrier Island 1240
ZL1ADR	Mr C Robertson	4 Dawn Pl, Te Atatu South, Waitakere City 0610
ZL1ADS	Mr W J Tibbles	19 Kotanui St, Army Bay, Whangaparaoa
ZL1ADT	Dr K R Orr	Po Box 95-151, Auckland 1230
ZL1ADW	Mr B E Clark	88 Lincoln Park Ave, Massey
ZL1AE	Mr E Browne	46 Holland Rd, Fairfield, Hamilton 3214
ZL1AEL	Mr J W Stanley	PO Box 525, Whangarei
ZL1AES	Mr A Skipper	624 Whangaparoa Rd, Stanmore Bay, Hibiscus Coast
ZL1AET	Mr A E Tse	Address Withheld
ZL1AF	Mr I W Ogier	32 Rangitane St, Palmerston North
ZL1AFB	Mr J L Offord	43 Queens Rd, New Plymouth
ZL1AFE	Mr P De Renzy	Puketutu Rd, RD 2, Matamata
ZL1AFF	Mr J Fleming	43 Burns St, Leamington
ZL1AFM	Mr P R Bellamy	36 Eton Rd, Hillsborough
ZL1AFO	Mr G Rogers	PO Box 79, Kaitaia
ZL1AFQ	Mr D A R Rosan	PO Box 65-147, Mairangi Bay, Auckland 1330
ZL1AFS	Mr T C M Cowley	850 Beach Rd, Waiake, Auckland 10
ZL1AFT	Mr K Walker	45 Apotu Rd, RD 1, Kamo, Whangarei
ZL1AFU	Mr R J Murphy	19 Litten Rd, Howick, Auckland 1704
ZL1AFV	Mr A R Boyce	26 Shakespeare St, Cambridge
ZL1AFX	Mr M R Kilsby	PO Box 733, Kununurra, WA 6743, Australia
ZL1AFY	Mr P J Coleman	2A Kohe St, Riverside, Whangarei
ZL1AFZ	Mr J P Mclean	Gorge Rd, RD 3, Pahiatua
ZL1AG	Mr A K Giles-Pain	Address Withheld
ZL1AGA	Mr J W Rasmussen	65 Smith St, Matamata
ZL1AGC	Mr K M Passau	PO Box 444, Drury, Auckland
ZL1AGG	Mr P E Bycroft	253 Shirley Rd, Papatoetoe, Auckland
ZL1AGK	Mr B Clarke	59 Blackwell Dr, Tryphena, Great Barrier Island, Auckland 0991
ZL1AGL	Mrs Y H De Gruyter	98 Maraetai Dr, Maraetai, Auckland
ZL1AGM	Mr A G Meharry	21 Suzanne Grove, Kelvin Grove, Palmerston North 4414
ZL1AGN	Mr M H Campbell	Fencourt Rd, RD 1, Cambridge
ZL1AGP	Mrs H Horwood	233 King St, Whakatane
ZL1AGR	Mr J K Cotton	Villa 177 / Acacia Cove, 127 Wattle Farm Rd, Wattle Downs Auckland 1702
ZL1AGS	Mr P E Collins	185 Victoria St, Cambridge
ZL1AGT	Mr E R Taylor	18 The Circle, Whangaparaoa, Auckland 1463
ZL1AGV	Mr L N Dixon	18 Koru St, Mangere Bridge
ZL1AGW	Mr D F Mcdonald	Margaret Pl, RD 1, Whitianga
ZL1AGY	Mr J A Easton	RD 9, Wheki Valley Hill, Whangarei
ZL1AGZ	Mr J D Delaney	41 Birdwood Rd, Swanson
ZL1AH	Mr J D Wightman	99C Eighth Ave, Tauranga
ZL1AHD	Mr M J Franklin	138 Barrett Rd, RD3, Albany, Auckland
ZL1AHK	Mr W Tester	48 Pulham Rd, Warkworth
ZL1AHL	Mr G L Mclellan	19 Kinder Pl, Ngongotaha, Rotorua
ZL1AHM	Mr A D Bell	182 Ocean Rd, Ohope
ZL1AHO	Mr R J Sykes	263 Shirley Rd, Papatoetoe, Auckland 1701
ZL1AHP	Mr L S Greendale	PO Box 301, Paihia
ZL1AHT	Mr I D Buckland	490 Coatesville Highway, RD 3, Albany 1331
ZL1AHW	Mr R P Hoban	462 Kaitemako Rd, Welcome Bay RD 5, Tauranga
ZL1AHX	Mr A M King	Unit 2/106 Victoria St, Onehunga, Auckland 6
ZL1AHZ	Mr B F Kidd	18 Addison Rd, Onerahi RD 1, Whangarei 0192
ZL1AI	Mr R G Badman	Villa 39, Lauriston Park, 91 Coleridge St, Cambridge
ZL1AIA	Mrs M B Baylis	1 Munro St, Onerahi, Whangarei
ZL1AIB	Mr N C Morris	PO Box 12357, Hamilton
ZL1AIF	Mr D M Reid	123 Mccoy Rd, RD 2, Opotiki 3092
ZL1AIH	Mr RKF McCormack	181 Ararimu Valley Rd, Waimauku, Auckland 0882
ZL1AII	Mr I R Mcfarlane	20 Hakarimata Rd, Ngaruawahia
ZL1AIJ	Mr C B Blake	4 Blackwell Dr, RD 1 Tryphena, Great Barrier Island
ZL1AIK	Mr P J Lewis	6 Tyburnia Ave, Mt Albert, Auckland
ZL1AIM	Mr I M Morrison	1520B State Highway 10, Kerikeri, RD3, Bay of Islands
ZL1AIP	Mr T H Parker	11A Albert St, Paeroa
ZL1AIR	Mr B E Armstrong	24 Beach Rd, Mangonui 0557
ZL1AIS	Mr R J Dyer	1712B State Highway 30, Rotorua
ZL1AIX	Mr W J Robinson	Address Withheld
ZL1AJ	Mr H F J Culloty	316/1 Budden Rd, Pokuru RD 5, Te Awamutu
ZL1AJD	Mr F J Krippner	Te Rore, RD 6, Te Awamutu
ZL1AJH	Mr A J Hobbs	97 Taupo Rd, Taumaruni 3920
ZL1AJI	Mr A W Jeffries	70 Woodglen Rd, Glen Eden
ZL1AJK	Mr W B Wood	8 William Souter St, Takapuna
ZL1AJL	Mrs C A Dewar	6 Syntax Pl, Conifer Grove, Takanini
ZL1AJM	Mr J G Morgan	26 Harold Ave, Kaikohe

CALL SIGNS

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ZL1AJN	Mr W S Holmes	997 Waiuku Rd, Waiuku
ZL1AJP	Miss A J Pope	Address Withheld
ZL1AJQ	Mr A H Hogan	PO Box 1497, Taupo
ZL1AJR	Mr R Chapman	39A West Tamaki Rd, Glen Innes, Auckland 1006
ZL1AJS	Mr J A Barker	PO Box 54229, The Marina 2144
ZL1AJT	Mr G D Jessop	Flat 1, 4 Inkerman St, Onehunga
ZL1AJV	Mr P J Irving	4 Scott Ave, Mangere Bridge
ZL1AJW	Mr P M Giles	13 Ozich Ave, Te Atatu
ZL1AJX	Mr J B Cox	4/95 Wheturangi Rd, Greenlane, Auckland 5
ZL1AJY	Mr M P Barratt	6 Brussells Pl, Birkenhead
ZL1AK	Mr B A Mitchell	PO Box 412, Matamata
ZL1AKB	Mr M L N Gillard	22 Stewart St, Whakatane
ZL1AKC	Mr B W Crook	PO Box 1699, Auckland
ZL1AKI	Mr C V Tait	46 Maygrove Village, 65 Tauranga Pl, Orewa
ZL1AKJ	Mr D L Studholme	22 Anita Ave, Mt Roskill
ZL1AKL	Mr E H Eagle	35 Argyll Rd, Tauranga
ZL1AKO	Mr R H Otto	Rangitane, RD 1, Kerikeri
ZL1AKP	Mr K B Pope	Address Withheld
ZL1AKS	Mr J N Wigley	23B Church St, Northcote Point, North Shore 0627
ZL1AKV	Mr D C Bell	3 Cuba St Rd, Waihi 3061
ZL1AKW	Mr D W J Horne	3 Vine Ave, Tauranga
ZL1AKX	Mr M B Passau	38 Awanui Rise, RD 2, Papakura
ZL1AKY	Mr G S Reed	510 Great South Rd, Papakura
ZL1AL	Mr T J Benton	C/- 5 Wilton St, Westown, New Plymouth
ZL1ALA	Mr J E Halden	154 Opua Rd, RD 2, Ngatea
ZL1ALC	Mr A L Christensen	116 Donald Rd, Kaitaia
ZL1ALD	Mr D W Smith	110 Douglas St, Whakatane
ZL1ALE	Mrs A B Johnston	2/29 Manse Rd, Papakura, Auckland
ZL1ALG	Mr N Osborne	15A Springfield Rd, Rotorua 3015
ZL1ALH	Mr I G Lochmann	19 Hillview St, Ngaruawahia
ZL1ALI	Ms A B Lee	P O Box 101 067, North Shore Mail Centre, Auckland 1330
ZL1ALK	Mrs C M Reed	510 Great South Rd, Papakura
ZL1ALN	Mr K G Duncan	2 Marsh Ave, Milford
ZL1ALQ	Mr E I Deverick	PO Box 33-1306, Takapuna, Auckland
ZL1ALR	Mr S R Kay	PO Box 28-176, Auckland 1136
ZL1ALS	Mr E L Salant	28A Mc Arthur Ave, St Heliers, Auckland
ZL1ALT	Mr N J Adams	Matangi Rd, RD 4, Hamilton
ZL1ALV	Mr R R Ussher	31A Deepcreek Rd, Browns Bay, Auckland 1310
ZL1ALX	Mr G K Gubb	Unit 4/278 Shirley Rd, Papatoetoe, Auckland 1701
ZL1ALY	Mr K Matthys	120 Kent Terrace, Taradale, Napier
ZL1ALZ	Mr A J Balsillie	Avon Rd, RD 1, Pokeno
ZL1AMB	Miss A M Bain	RD 2, 58 George St, Pukekohe
ZL1AMC	Mr O H Zwies	182 Stafford St, Hokitika 7810
ZL1AMD	Dr A McDonald	9 Tutaritai Rd, Hahei
ZL1AME	Mr F G Crook	17 Hanlon Cres, Devonport, Auckland 1309
ZL1AMF	Mr K F Gosling	131 Onerahi Rd, Whangarei, Northland
ZL1AMG	Mrs A M Mcgee	97A Balmain Rd, Birkenhead, Auckland 10
ZL1AMH	Mr A Holroyd	417A Kamo Rd, Kamo, Whangarei
ZL1AMI	Mr R A Jamieson	11 Phillips Dr, Oropi Downs, RD 3, Tauranga
ZL1AMJ	Mr J R Saunders	187 Gill St, New Plymouth
ZL1AMM	Mr R E Murphy	14P Cradock St, Avondale, Auckland 1007
ZL1AMN	Mr D A Johnston	2/29 Manse Rd, Papakura, Auckland 1703
ZL1AMO	Mr R W Wright	28 Chorley Ave, Massey
ZL1AMP	Mr A Petricevich	5 Seakens Way, Glen Eden, Waitakere City 0602
ZL1AMQ	Mr F G Male	67 Waipuna Rd, Mt Wellington
ZL1AMR	Mr I M Lindsay	31 Cottesmore Pl, Huntington Park, East Tamaki, Auckland 2013
ZL1AMT	Mr D A Moore	2 Kanuka Way, Albany, Auckland 1311
ZL1AMW	Mr A J Wallace	14 Acacia Pl, Glenview, Hamilton
ZL1AMY	Mr I G Fletcher	248 East Coast Rd, Takapuna
ZL1AMZ	Mr T Glendenning	16 Meadow Dr, Whitianga 2856
ZL1AN	Dr G E J Bold	15 Kauri Rd, Birkenhead, Auckland 1310
ZL1ANA	Dr G T Bold	14 Chelsea View Dr, Birkenhead, Auckland
ZL1AND	Mr A B Turner	7 Acmena Ln, Pakuranga
ZL1ANE	Mr J C Gingles	RD 3, Te Maika Rd, Whangarei
ZL1ANF	Mr W M Beale	12 Emerson St, Te Aroha 3320
ZL1ANH	Mr G K Hunt	6 Newton Watts Dr, Kerikeri 0294
ZL1ANI	Mr K A Bell	62B Eden Tce, Kamo
ZL1ANJ	Mr J M Ellis	3 Hawera Rd, Kohimarama
ZL1ANL	Mr I G Smith	Address Withheld
ZL1ANM	Mr N M Barnett	Unit 4/92 Cadness St, Northcote, Auckland 1309
ZL1ANP	Mrs N L Parsons	509/1 Mutu St, Te Awamutu
ZL1ANT	Mr B Pattison	Address Withheld
ZL1ANY	Mr S G Pearce	C/- Anaesthetics Department, Whangarei Area Hospital, Whangarei
ZL1AO	Mr J N Allison	P O Box 79365, Royal Heights
ZL1AOA	Mr J R Whitney	35B Wallis St, Raglan
ZL1AOB	Mr G N Harrop	8 Waingaro Rd, Ngaruawahia
ZL1AOC	Mr H R T Henderson	Apt 241, Summerset Village
ZL1AOD	Mr C D Byrnes	31 Rosehill Dr, Papakura
ZL1AOH	Mr M I Stewart	T.H. 130 Hilda Ross Village, 30 Ruakura Rd, Hamilton
ZL1AOI	Mr V G Trethowen	13 Woodvale Rd, Glen Eden, Auckland 1007
ZL1AOL	Mrs J Dines	30 Atlantis St, New Brighton, Christchurch 8803
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ZL4TFL	Mr J B Collier	86 Mailer St, Dunedin
ZL4TFM	Mrs F M McKenzie	33 Ailsa St, Wallacetown
ZL4TFP	Mr W M Bedford	C/O Milburn Gardens RD 2, Milton
ZL4TFV	Mr D G Calder	P O Box 113, Winton 9662
ZL4TFY	Mr G Craighead	162 Balmacewen Rd, Dunedin
ZL4TGA	Mr P R Scott	99 Gilkison St, Dunedin
ZL4TGB	Mr W A Grant	PO Box 375, Dunedin
ZL4TGF	Mr G B Williams	64 Forfar Cres, Invercargill
ZL4TGH	Mr R C Connolly	PO Box 1229, Dunedin
ZL4TGJ	Mr A D Pettigrew	PO Box 6, Manapouri 9643
ZL4TGM	Mr W A Black	West Coast Rd, R D 1, Awanui 0552
ZL4TGP	Mr R M Watson	21 Arcus St, Whangarei
ZL4TGQ	Mr B Andrews	14 Como St, Maori Hill, Dunedin
ZL4TGW	Mr G W Wright	Address Withheld
ZL4TH	Mr S N Larsen	26 Columba Ave, Lookout Point, Dunedin
ZL4THE	Mr A W Booth	PO Box 36603, Merivale, Christchurch 8146
ZL4THF	Mr G G Burge	7 Weston Way, Ryelands, Lincoln, Christchurch 7608
ZL4THG	Mr K J McAuliffe	PO Box 56, Kingston 9660
ZL4THJ	Mr M J Rabbidge	Crayburn Farm, Graham Rd, RD 1, Tokanui
ZL4THN	Mr I R Hannah	Address Withheld
ZL4THP	Mr K J V Da-Rin	141 Forbury Rd, St Clair, Dunedin
ZL4THQ	Mr G R Crimp	31 Davies Rd, New Plymouth
ZL4THT	Mr A R Blee	7 Campbell St, Alexandra
ZL4THZ	Mr C J Mclean	RD 1, Longbush, Invercargill
ZL4TID	Mr G F Mcrae	1 Hillcrest Ave, Mataura 9690
ZL4TIE	Mr B J Barber	Glencoe, Invercargill
ZL4TIG	Mr A R M Hill	16 Wyre St, Kaitangata
ZL4TII	Mr W E Peirson	16 Gardiners Rd, Bishopdale, Christchurch
ZL4TIK	Mr A J Curline	16 Derby St, Green Island
ZL4TIL	Mr I J Drage	C/O 12 Grey St, Invercargill 9501
ZL4TIM	Mr N R Watson	27 Reading St, Christchurch 4
ZL4TIO	Mr J S Moore	10 Dalrymple St, Dunedin
ZL4TIR	Mr P J Woodrow	32 Baker St, Stirling 9200
ZL4TIY	Mr G M Larooy	85 Riverlea Estates Dr, Riverlea Estates, Belfast, Christchurch
ZL4TJE	Mr A Townsend	18 Kingsbridge Pl, Newlands, Wellington 5037
ZL4TJP	Mrs F A Askin	408 Harewood, Bishopdale, Christchurch
ZL4TJR	Mr J F Taylor	Address Withheld
ZL4TKK	Mr R W Spence	41 Black Rd, Otatra RD 9, Invercargill
ZL4TKM	Mr G Mitchell	17 Kaka Rd, St. Leonards, Dunedin
ZL4TKQ	Mr N L A Tamplin	58 Cooper St, Karori, Wellington
ZL4TKR	Mrs G J Taylor	Address Withheld
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ZL4TPJ	Mr P J Dixon	Address Withheld
ZL4TR	Mr E W Armstrong	15 London St, Weston, Oamaru 8901
ZL4TRM	Mr R N Mclennan	161 Hall Rd, Sawyers Bay, Dunedin
ZL4TRS	Mr R A Sheat	Mclew St, Kennington RD 1, Invercargill
ZL4TRW	Mr R D Codling	11A Seddon St, Timaru
ZL4TS	Mr J W Smith	C/- David Pearson, P O Box 13125, Green Island, Dunedin
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ZL4TSR	Mr S R Forrester	43 Thurso St, Invercargill
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ZL4TUX	Mr G P Barkman	31Ascot St, St Kilda, Dunedin
ZL4TWO	Mr D J Clarkson	22 Jackson St, Dunedin
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ZL4TY	Mr R Crawford	53 Moore St, Kingaroy, Queensland, Australia 4610
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ZL4UHF	Mr S J Aldridge	RD 4, Underwood, Invercargill
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ZL4UK	Mr J B Jones	2 Dudley Pl, Maori Hill, Dunedin
ZL4US	Mr M G Lambert	38 Ayr St, Mosgiel
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ZL4VAC	Mr D Bootsma	8 Selwyn St, Oamaru
ZL4VAD	Mr J W Meikle	15 Girvan St, Oamaru
ZL4VAP	Mr A D Popham	47 Kelso Cres, Invercargill
ZL4VAQ	Mr J W Needham	Flat 2, 232 Spey St, Invercargill
ZL4VCS	Mr C D Stephen	53 Antimony Cres, Cromwell
ZL4VDF	Mr D N Findlater	41 Montague St, Dunedin
ZL4VDM	Mr D R Miller	34 Herron St, Brockville, Dunedin
ZL4VEH	Mr E J Hunt	691 Portobello Rd, Broad Bay, Dunedin
ZL4VET	Ms Christina Rock	150 Atawhai Rd, Massey University, Palmerston North
ZL4VGA	Mr R G Anderson	121 Elgin Rd, Mornington, Dunedin

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ZL4WC	Mr I D Wishart	Address Withheld
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ZL4WDR	Mr P Jenkins	Address Withheld
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T Andrews, 68 Khandallah Road, Wellington 6035
W Andrews, 68 Khandallah Road, Wellington 6035
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R P Greenbank, PO Box 26098, Newlands, Wellington 6442
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M Johnson, 15 Field Street, Silverstream ,Upper Hutt 5019
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Call-sign	Branch	Title	Trustee	Address
Z1IS	81	Waikato VHF Group (Inc)	Refer Branch Directory	
ZL11B	53	NZART Te Puke Branch Inc	Refer Branch Directory	
ZL1AA	2	NZART Auckland Branch Inc	Refer Branch Directory	
ZL1AB	21	Manukau Radio Club	Refer Branch Directory	
ZL1AB	29	North Shore Branch 29 NZART	Refer Branch Directory	
ZL1ABCD		Auckland Contest Club (Acc)	Mr J Calvo	C/- Jacques Calvo, 31 Raurenga Ave, Epson, Auckland
ZL1AC	3	Western Suburbs Radio Club Inc	Refer Branch Directory	
ZL1ACS		Ken Clarke Radio Club	Mr P Granger	585 Bedford Road North, RD8, Inglewood 4388
ZL1AM	28	Whangarei Amateur Radio Club	Refer Branch Directory	
ZL1BCO	60	NZART Taupo Branch	Refer Branch Directory	
ZL1BL	17	Huntly Branch 17 Amateur Radio Club	Refer Branch Directory	
ZL1BN		Northern DX Association	Mr M K Woodfield	182 Ingleton Road, RD 2, Wellsford
ZL1BOI	84	Bay Of Islands Amateur Radio Club (Inc)	Refer Branch Directory	
ZL1BQ	66	Auckland VHF Group (Inc.)	Refer Branch Directory	
ZL1BY	72	Opotiki Amateur Radio Club	Refer Branch Directory	
ZL1CB	40	NZART Te Auamutu Branch 40	Refer Branch Directory	
ZL1CCT	83	NZART Raglan Branch 83 Inc	Refer Branch Directory	
ZL1DF	41	Thames Branch NZART Inc	Refer Branch Directory	
ZL1FND	78	Far North District Amateur Radio Club	Refer Branch Directory	
ZL1FU	80	Hibiscus Coast Amateur Radio Club Inc	Refer Branch Directory	
ZL1HF	44	Matamata Amateur Radio Club	Refer Branch Directory	
ZL1HK		South Auckland Repeater Group		C/- A V Walker, 51 Caronia Cres, Mt Roskill, Auckland
ZL1HP	4	Cambridge Amateur Radio Club	Refer Branch Directory	
ZL1IZ	55	Waitomo Branch 55 NZART (Inc)	Refer Branch Directory	
ZL1KDX		Amateur Radio Field Station Group		225 Bridgman Road, Te Awamutu,
ZL1KW	67	NZART Kawerau Branch	Refer Branch Directory	
ZL1MCC		Manukau City Council (Amateur Radio)	Mr M R Lowry	31 To 33 Wiri Station Road, Manukau, Auckland
ZL1MUA		Massey University LEO Satellite Ground Station		Massey University Institute Of Information And Mathematical Sciences, Private Bag 102904 Nsmsc Auckland 1330,
ZL1QW	43	Waihi & District Branch NZART Inc	Refer Branch Directory	
ZL1REG		Radio Electronrcs Group	Mr J T Lisignoli	The Secretrary, No. 14 Northmeadow Drive, Rototuna
ZL1RMC		Rosmini College Parent Teachers Friends Association (Inc)		36 Dominion Street, Takapuna, Auckland
ZL1ROD	71	Rodney Amateur Radio Club Inc	Refer Branch Directory	
ZL1ROT	33	Rotorua Branch 33 (NZART) Inc	Refer Branch Directory	
ZL1SA	10	Franklin Amateur Radio Club Inc	Refer Branch Directory	
ZL1SKC		Saint Kentigern College	Mr K D Ferguson	PO Box 51-060, Pakuranga,
ZL1TB	70	Howick & Dislricts Radio Club	Refer Branch Directory	
ZL1TEC	88	Tauranga Emergency Communications Group	Refer Branch Directory	
ZL1TP	39	Tauranga Amateur Radio Club Inc	Refer Branch Directory	
ZL1UX	12	Hamilton Amateur Radio Club (Inc)	Refer Branch Directory	
ZL1VK	65	Papakura Radio Club Inc	Refer Branch Directory	
ZL1WCD		Waitakere Civil Defence Radio Club		7 Elcoat Avenue, Henderson, Auckland
ZL1WK	51	NZART Eastern BOP Branch	Refer Branch Directory	
ZL1ZLD	86	Suburban Amateur Radio Club Inc	Refer Branch Directory	
ZL1ZLF		Musick Memorial Radio Station Museum	Mr I D Walker	C/- Suburban Amateur Radio Club Inc, PO Box 163060, Lynfield, Auckland 1008
ZL2AA	11	Gisborne Amateur Radio Club Inc	Refer Branch Directory	
ZL2AA	46	NZART Wairarara	Refer Branch Directory	
ZL2AB	27	New Plymouth Amateur Radio Club	Refer Branch Directory	
ZL2AJZ		Massey University (Electronics) Amateur Radio Club	Mr A G Kennedy ZL1BYP	Private Box 756, Wellington
ZL2AMR	70	Feilding & Districts Radio Club	Refer Branch Directory	
ZL2AMS	23	Marton Branch NZART	Refer Branch Directory	
ZL2ANN	32	Opunake Radio Club, Inc Rahotu Br. NZART	Refer Branch Directory	
ZL2ARG	26	NZART Nelson Branch Inc	Refer Branch Directory	
ZL2AS	13	Hastings Branch NZART (Inc)	Refer Branch Directory	
ZL2AW	42	Titahi Bay Amateur Radio Club Inc	Refer Branch Directory	
ZL2DS	16	Horowhenua Branch 16 NZART	Refer Branch Directory	
ZL2GK	24	Motueka Branch NZART	Refer Branch Directory	
ZL2GT	25	Napier Amateur Radio Club Inc	Refer Branch Directory	
ZL2HV	18	NZART Huit Valley Branch Inc	Refer Branch Directory	
ZL2IB	6	Tararua Diskict Radio Club	Refer Branch Directory	
ZL2JA	48	Wanganui Branch NZART	Refer Branch Directory	
ZL2KB	69	NZART Kapiti Branch Inc	Refer Branch Directory	
ZL2KO	20	NZART Manawatu Branch Inc	Refer Branch Directory	
ZL2KS	22	NZART Marlborough Branch 22 Inc	Refer Branch Directory	

Call-sign	Branch	Title	Trustee	Address
ZL2LHW	63	Upper Hutt Branch NZART Tnc	Refer Branch Directory	
ZL2M		East Coast Contesters	Mr L F Jennings	87 Auckland Rd, Greenmeadows, Napier
ZL2MG	45	Waimarino Branch NZART	Refer Branch Directory	
ZL2NX		Kiwi Contest Group		C/O Mr TJ Hogan, PO Box 39-166, Wellington Mail Centre, Wellington
ZL2PT	19	Inglewood Branch 19 NZART	Refer Branch Directory	
ZL2QF	87	South Taranaki (Inc.)	Refer Branch Directory	
ZL2QH		Wellington Amateur Radio Club Inc (Quartz Hill)		PO Box 6464, Marion Square
ZL2RN		Royal Naval Amateur Radio Society NZ Branch		34 Bell Street, Otaki,
ZL2RS		Royal Signals Amateur Radio Society	Mr C M Kempson	C/- C M Kempson, 399B Te Moana Road, Waikanae
ZL2SWR	82	Southern Wairarapa Branch NZART	Refer Branch Directory	
ZL2TO	47	NZART Waitara Branch Inc	Refer Branch Directory	
ZL2VH	63	Upper Hutt Branch NZART Inc	Refer Branch Directory	
ZL2WA	74	Wellington VHF Group Inc	Refer Branch Directory	
ZL2WB	50	Wellington Amateur Radio Club (Inc.)	Refer Branch Directory	
ZL2WRC		Wairarapa College Radio Club		PO Box 463, Masterton,
ZL3AC	5	NZART Christchurch Branch 05 Inc	Refer Branch Directory	
ZL3ADG		Burnside High School Radio Club		Greers Rd, Christchurch,
ZL3AF	1	Ashburton Branch NZART	Refer Branch Directory	
ZL3BRC	62	Reefton-Buller Branch NZART	Refer Branch Directory	
ZL3CAR		Canterbury Amateur Radio Development Society Incorporated	Mr M S Barnes	
ZL3GY	49	Westland Branch NZART	Refer Branch Directory	
ZL3RNL		Rangiora New Life School Amateur Radio Club	Mr J M Berends	Denchs Rd, Southbrook, Rangiora
ZL3RPS		Radio Preservation Society Of NZ (Ferrymead) Inc		269 Bridle Path Rd, Christchurch,
ZL3RR	68	North Canterbury Amateur Radio Club	Refer Branch Directory	
ZL3UR	34	South Canterbury Branch Inc	Refer Branch Directory	
ZL3VV	56	Christchurch West Amateur Radio Club	Refer Branch Directory	
ZL3WP		Buller High School Radio Club		35 Derby St, Westport,
ZL4AA	30	NZART Otago Branch Inc	Refer Branch Directory	
ZL4AL	8	Eastern Southland Branch NZART Inc	Refer Branch Directory	
ZL4FUN		NZART HQ	Mrs D Morgan	C/- NZART, PO Box 40-525, Upper Hutt
ZL4GQ	37	NZART Southland Branch Inc	Refer Branch Directory	
ZL4JF	35	NZART South Otago Branch 35	Refer Branch Directory	
ZL4KHS		Kings High School Radio Club	Mr K A Hand	270 Bayview Rd, South Dunedin, Dunedin 9012
ZL4NQ	75	NZART Queenstown Branch 75 Inc	Refer Branch Directory	
ZL4OO	61	NZART Central Otago Branch Inc	Refer Branch Directory	
ZL4OU	64	NZART North Otago Branch 64	Refer Branch Directory	
ZL50JA		Wanganui Branch NZART		
ZL6A		New Zealand Association Of Radio Transmitters Inc	Mr J Ingham	PO Box 40-525, Upper Hutt
ZL6B		New Zealand Association Of Radio Transmitters Inc		
ZL6CC		NZART Marlborough Branch 22 Inc		
ZL6FF		FISTS Club - NZ Chapter	Mr R Sutton	12C Herbert Gardens, 186 The Terrace, Wellington
ZL6IW		New Zealand Association Of Radio Transmitters Inc		
ZL6JAM		NZART Christchurch Branch 05 Inc		
ZL6KCM		Kapiti Coast Museum Waikanae Inc	Mr G A Anderson ZL2JG	9 Elizabeth Street, Waikanae 6010,
ZL6LHW		Upper Hutt Branch NZART Inc		
ZL6LIT	12	Hamilton Amateur Radio Club (Inc)	Refer Branch Directory	
ZL6NS		Wellington VHF Group Inc		
ZL6OTC		New Zealand Old Timers Club (ZL)		25 Annandale Street, New Plymouth
ZL6R		New Zealand Association Of Radio Transmitters Inc		
ZL6RFA	27	New Plymouth Amateur Radio Club	Refer Branch Directory	
ZL6RR		North Canterbury Amateur Radio Club		Refer Branch Directory
ZL6SAT		Amsat-ZL	Mr T D Carrell	C/- NZART, PO Box 40-525, Upper Hutt
ZL6TOC		Gisborne Amateur Radio Club		Refer Branch Directory
ZL6YL		NZ Women Amateur Radio Operators		C/O Mrs Jn O'Donnell, 39 Lismore St, New Plymouth
ZL6ZA		NZART Manawatu Branch Inc		Refer Branch Directory
ZL80WB		Wellington Amateur Radio Club (Inc.)		PO Box 6464, Marion Square, Wellington
ZL8R		Microlite Penguins Dxpedition Team	Mr C C Hannagan	C/- Chris Hannagan, 173 Southdown Rd, RD 1
ZL94ANZAC	74	Wellington VHF Group Inc	Refer Branch Directory	

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ZK6EXS	National Secretary	Doug Cooke	ZL1TTE	(09) 846-6075	(027) 497-8121				
ZK1EX	Area ManagerZL1	Richard Gamble	ZL1BNQ	(09) 537-1238	(021) 729-270	Jim Rowe	ZL1AVR	(07) 868-9193	(027) 235-7266
ZK8EX	Area ManagerZL2	John Yaldwyn	ZL4JY	(04) 478-3222	(04) 499-6000	Terry Waghorn	ZL2AYY	(06) 306-8926	(027) 488-7271
ZK9EX	Area ManagerZL3	Gareth Bradshaw	ZL3VP	(03) 332-2406	(027) 432-4738	Paul Rennie	ZL2RE	(03) 578-5311	(027) 458-9740
ZK4EX	Area ManagerZL4	Bill Olsen	ZL4AE	(03) 455-7884	(027) 436-9107	Martin Balch	ZL4JH	(03) 454-3262	(027) 437-5242
ZK6EX	Land SAR Liason	Jeff Sayer	ZL4JS	(06) 370-1245	(027) 450-8022				
ZK6EXT	Nat.Training Officer	TBA							

AREC SECTION LEADERS & DEPUTIES

E.Call	Section	Section Leader	Call	Home	Work/Mobile	Deputy Leader	Call	Home	Work/Mobile
ZK1EA	Auckland	Japie Nel	ZL1JJN	(09) 537-3852	(021) 217-8601	Steve Miller	ZL1FS	(09) 528-5756	(021) 022-6498
ZK1EB	North Shore	Marcel Montile	ZL1ME	(09) 443-1011	(021) 210-5984	Graham Barton	ZL1GMB	(09) 446-0089	
ZK1EC	Hamilton	David Nation	ZL1TCE	(07) 843-0108	(027) 474-3292	Paul Jonassen	ZL1UPJ	(07) 847-9719	(021) 298-7780
ZK1ED	Te Awamutu	Brian Farrell	ZL1HN	(07) 843-4847	(021) 203-4193	Mervyn Owen	ZL2AVY	(07) 871-9992	
ZK1EG	Northland	Brian Winger	ZL1BSW	(09) 438-3862	(027) 491-3888	Don Ewen	ZL1DTE	(09) 432-0185	(027) 451-9940
ZK1EI	Thames	Jim Rowe	ZL1AVR	(07) 868-9193	(027) 235-7266	Mary Sutton	ZL1UHZ	(07) 868-7290	(021) 185-7250
ZK1EJ	Tauranga ECG	Don Spackman	ZL1MK	(07) 543-2730	(021) 066-3380	Alison Eade	ZL1PD	(07) 579-9739	(027) 451-9693
ZK1EK	Western Suburbs	Ross Reddell	ZL1VRR	(09) 629-0504	(027) 622-1055	Merv Thomas	ZL1SK	(09) 828-7174	(027) 499-0262
ZK1EM	Eastern B.O.P.	Alan McDonald	ZL1PI	(07) 308-7740	(027) 604-8844	Don Croll	ZL1TBP	(07) 308-7699	
ZK1EN	Franklin	Colin Shuker	ZL3CJS	(09) 239-2635	(027) 493-1025	Bob Holt	ZL1BBZ	(09) 235-9549	(027) 200-0331
ZK1EO	Kawerau	Barry Liddle	ZL1CAY	(07) 323-8970	(021) 223-2901	Bob Krause	ZL1TMK	(07) 323-8560	
ZK1EQ	Rotorua	Peter Dare	ZL1PJ	(07) 345-6469	(07) 343-5883	Murray Thompson	ZL1SY	(07) 348-9741	
ZK1ES	Papakura	Richard Gamble	ZL1BNQ	(09) 537-1238	(021) 729-270	David Karrasch	ZL1DK	(09) 298-5271	(021) 560-180
ZK1EU	Manukau	Granville Emmett	ZL1BYD	(09) 273-2673	(027) 471-1731	Ivan Lindsay	ZL1AMR	(09) 272-8295	
ZK4EA	Otago	Lindsey Ross	ZL4KS	(03) 487-8946	(021) 116-1686	David Stevenson	ZL4SB	(03)454-2527	(027) 435-7307
ZK4EB	E. Southland	Lindsay Eunson	ZL4LC	(03) 206-4587	(027) 432-5136	Murray Giles	ZL4MG	(03) 208-6803	(021) 169-5647
ZK4ED	Balclutha	John Blair	ZL4AM	(03) 415-7849	(027) 284-4283	Russell Bennett	ZL3GM	(03) 417-7411	
ZK4EE	Centr.Otago	J. Lochhead	ZL4QS	(03) 448-8552	(027) 273-5785	TBA			
ZK4EF	North Otago	Neil McLeod	ZL4SN	(03) 434-7253	(027) 334-7759	Gary Millar	ZL4TA	(03) 434-5993	(03) 434-5029
ZK6EE	Auckland VHF Grp.	Laurie Mathews	ZL1ICU	(09) 634-5130	(027) 481-7463	Franc Dunhton	ZL1SLO	(09) 829-2003	(021) 396-381
ZK8EA	Gisborne	Alan Mackintosh	ZL2AOP	(06) 868-6267		Roly Haisman	ZL2APH	(06) 868-6422	
ZK8EB	New Plymouth	Jill O'Donnell	ZL2DBO	(06) 758-1429		Wayne Gaudin	ZL2VN	(06) 753-5800	(06) 753-6139
ZK8EC	Motueka	Robin Reeve	ZL2FZ	(03) 528-6868	(021) 634-993	Jim Jackson	ZL2BCG	(03) 528-8357	
ZK8EE	Hastings	Robert Wallace	ZL2SG	(06) 878-4993	(027) 434-4027	Warren Harris	ZL2AJ	0800-219284	(021) 649-284
ZK8EF	Kapiti	Len Blackley	ZL2GO	(04) 904-7048	(021) 071-7114	David Chapman	ZL2DWC	(04) 298-7252	
ZK8EG	Wellington VHF Grp	John Yaldwyn	ZL4JY	(04) 478-3222	(04) 499-6000	Jeff Sayer	ZL4JS	(06) 370-1245	(027) 450-8022
ZK8EH	Tararua District	Stephen Cooper	ZL2WAU	(06) 374-8288	(021) 548-288	Jim Edwards	ZL1UBE	(06) 374-7261	(021) 156-2524
ZK8EI	Manawatu	Len Inkpen	ZL2LI	(06) 357-1493	(027) 447-4034	Cherly Weatley	ZL2VCC	(06)326-8551	(027) 223-3677
ZK8EJ	Wairarapa	David Bray	ZL2BA	(06) 378-8288	(027) 449-5146	Gavin McAnulty	ZL2VGB	(06) 377-3978	(027) 429-16105
ZK8EL	Upper Hutt	Maurice Vile	ZL2ADP	(04) 976-9022		Gavin Smith	ZL2ACT	(04) 970-8533	(027) 226-5719
ZK8EN	Nelson	Dave Scott	ZL2BCA	(03) 545-0237	(027) 446-4714	Brian Hawken	ZL2BJ	(03) 547-0382	(021) 230-9592
ZK8EO	Marlborough	Paul Rennie	ZL2RE	(03) 578-5311	(027) 458-9740	Ron Harris	ZL2BDD	(03) 575-7181	(021) 103-5143
ZK8ES	Horowhenua	Kenneth Ireland	ZL2KI	(027) 444-9449	(027) 444-9449	James Jones	ZL2USA	(06) 368-1122	(021) 763-939
ZK8EW	Marton	Brian Purdie	ZL2ADL	(06) 329-3606	(027) 321-4470	Jim Vernon	ZL2BHX	(06) 388-1855	(027) 446-2628
ZK8EY	Hutt Valley	Phill Lewton	ZL2HF	(04) 567-9354		Bob Sewell	ZL2ASO	(04) 564-6929	
ZK8 ??	South Taranaki	Michael Mulholand	ZL2WJM	(06) 278-6155	(027) 326-0864	Gary Legge	ZL2GLM	(06) 278-6586	
ZK9EA	Christchurch	Dudley Berry	ZL3GG	(03) 389-4718	(027) 436-4405	Steve Davis	ZL2UCX	(03) 348-0360	(027) 436-1796
ZK9EB	Westland	Graham Hay	ZL3WMM	(03) 768-9499	(021) 114-6840	Kevin O'Sullivan	ZL3ABY	(03) 768-7598	(027) 498-6435
ZK9EC	Sth.Canterbury	Glenn May	ZL3GL	(03) 686-0306	(027) 433-5022	David Hetherington	ZL3UDH	(03) 688-3619	(027) 687-6787
ZK9ED	Ashburton	Jim Nelson	ZL3ND	(03) 318-5827	(027) 289-3833	Steve Graham	ZL2BBK	(021) 745-051	
ZK9EG	Nth.Canterbury	Geoff Gillman	ZL3QR	(03) 313-7137	(027) 647-5490	Don MacDonald	ZL3DMC	(03) 327-7415	(027) 551-6683

AREC records have been updated from the National Database. Any additions or omissions to AREC Secretary, P.O. Box 44-132, Pt Chevalier, Auckland

This is a list of active AREC sections based on 'Activity Reports' received by the AREC Secretary over a 18 month period. Correct as at July 2010

MONITORING SERVICE

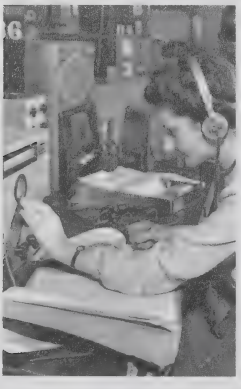
The IARU Monitoring Service (MS), a global organisation, was formed in Geneva in 1985. It comprises three regional MS, with New Zealand being in region 3. In turn the regional MS are made up from the national societies' MS, such as the NZART MS, with national co-ordinators and other volunteers who assist in reporting, identifying and dealing with non-amateur interference on the amateur bands. This structure provides a mechanism through which ordinary radio amateurs in any country can identify and report harmful interference on the amateur bands and, where necessary, escalate things to the regional or international bodies and various regulatory authorities for concerted action.

The radio frequency spectrum is a limited, shared resource that is constantly under pressure from multiple users, not all of whom respect the rights of radio amateurs. It is clearly in our interests to protect the amateur frequencies allocated for our use. With the increasing demands for spectrum space and the tendency of some administrations to ignore their responsibilities under the ITU convention, the amateur service must maintain a strong and effective MS if it is to retain its frequency allocations. It is vital that we continue to present factual, authoritative information about intruders to the authorities, and proactively defend our rights. The cooperative, global nature of the IARU MS provides us with a more powerful voice.

Intruders

An intruder is any non-amateur radio transmission in the exclusive amateur bands. Note that not all amateur bands are exclusively allocated to us: we have access to some on a primary or secondary basis alongside other users with mutual non-interference obligations, and the allocations vary globally. Some intruders are unlicensed pirates. Some administrations claim the right to use any frequency they like including the amateur bands – some (such as North Korea) are not members of the ITU, while a few casually ignore certain ITU regulations at their convenience. Some do not even appreciate that they are causing harmful interference by spurious or harmonic radiation, and that is where the MS can help by bringing the problem to their notice.

Radio was a more elusive medium to track and be sure what was being said and in what tone.



Courtesy of BBC Monitoring "A History of Caversham Park."

Harmful interference

Harmful interference is that which seriously degrades obstructs or repeatedly interrupts a radiocommunication service, such as the Amateur Service, operating in accordance with the ITU Radio Regulations. Harmful interference is classed as either out-of-band or spurious emissions:

- **Out-of-band emissions** are emissions on a frequency or frequencies which are outside the necessary bandwidth, which result from the modulation process. Their choice of frequency is normally deliberate and intentional;
- **Spurious emissions** are emissions outside the necessary bandwidth, the level of which may be reduced without affecting the corresponding transmission of information. Spurious emissions include harmonics, parasitics, intermodulation products ("intermod") and frequency conversion products. These are normally accidental or unintentional transmissions. Whether or not they fall within permitted technical limits (e.g. harmonics so many decibels down from the fundamental), they may still interfere with amateur transmissions.

The growth of digital computing, networking and telecommunications equipment is causing severe interference problems for many radio amateurs. Some of the worst offenders are PCs, plasma screens, WiFi routers and switch mode power supplies (not least those in many amateur households!) which tend to cause relatively localised problems that can sometimes be reduced using suitable ferrite cores, by increasing the distance between antennas and nearby buildings, or by replacing offending items with quieter/better screened equipment. Experimental technologies such as "Broadband over Power Lines" (BPL) have the potential to wipe out entire HF bands over wider areas, while collectively such wideband interference sources are raising the noise floor for us all. This insidious threat is of great concern to NZART MS and our colleagues abroad, especially since many amateurs rely on relatively low power transmissions and hence weak signals over difficult paths that seldom concern other radiocommunication services.

Reporting

The most direct way for ZL amateurs and SWLs to report amateur band intruders is by email (our contact details are given below). When reporting, please provide as much information as possible to help us characterise the intruder, namely:

- The spot **frequency or frequency range** over which interference was caused, as accurately as you can;
- The **date and time or time period** in which it occurred, in UTC please;
- The nature of the interfering signal, ideally stating the **mode or type of emission** using the official designations but if not some indication such as Over The Horizon Radar (OTHR), Coastal Ocean Dynamics Applications Radar (CODAR), USB/LSB, AM, FM or digital modes (note: to help you identify obscure signals, there are several audio samples on the NZART MS Web page at http://www.nzart.org.nz/ms plus links to additional helpful Web resources elsewhere).
- Any **station call-sign or identification** transmitted by the intruder (hint: listen out for jingles and station IDs transmitted at the top of the hour by most commercial broadcasters);
- **Other helpful remarks** such as any traffic or text transmitted, the length of transmissions or how often the transmissions have been heard, type of music or background noises, languages spoken, peak direction (azimuth) from your Maidenhead locator or town, approximate signal strength etc.;
- If you have the opportunity, please also attach an **audio sample** as an MP3 or WAV file, and/or an audio spectrum "waterfall" image: these provide invaluable supporting evidence.

On receipt of an intruder report, the NZART MS voluntary observers, in conjunction with our colleagues in ZL, VK, IARU Region 3 and sometimes further afield, will further analyse the information, for example to determine the specific type/mode of transmission or language used. If reports are received promptly, we usually check to find out whether we can also hear the same intrusion (indicating a widespread problem) or not (possibly a localised or short term interference source). Collating and comparing intruder reports from many reports increases the probability of being able to identify the sources. Using direction finding techniques, for example, we may be able to tell the approximate or actual source locations (more below). We always try to provide feedback to reporters, for instance confirming whether this is a known intruder that we are already dealing with, or a newcomer that needs further work. Intruder reports from ZL feed our regular consolidated reporting to IARU Region 3 MS and are disseminated in turn to the other two regions.

Direction Finding

Direction finding involves identifying the locations from which signals are transmitted. At least two contemporaneous reports on the same signal are normally required to triangulate signals on the HF bands: one may be your own station while others may belong to other MS volunteers or even Web-accessible Software Defined Radios (SDRs) such as http://websdr.ewi.utwente.nl:8901/ or http://www.websdr.org/. You may be able to help us without even owning a receiver or antenna, for example finding out whether there is propagation to our part of the globe at that time from the area where we suspect an intruder might be located.

If you have some sort of rotatable beam antenna, the intruder

Broadcast reception in the Listening Room "History of Caversham Park."

normally lies somewhere along the great circle direction that gives the maximum signal strength. If you have a rotatable dipole, nulls off both ends of the dipole can be used to indicate two approximate directions by turning the antenna until the signal dips out. Under certain circumstances, intruders may even be located by accurately timing pulses received simultaneously over both short and long paths (this is where audio recordings of repetitive pulse radar systems can prove useful). As a last resort, simply reporting what other parts of the world you could hear at that time, or the language used, gives a very rough indication of the possible location of an intruder. You never know, someone else may be able to corroborate your report and so fill-in the missing information.

Reporting Local Intruders to the Radio Spectrum Management

Any one can report an intruder, suspected pirate or interference to the Radio Spectrum Manager group via the procedure outlined in http://www.rsm.govt.nz/cms/consumers/copy_of_reception-problems/how-can-i-register-an-interference-complaint. However, in the majority of cases, direct liaison with the miscreant normally solves the issue with assistance from the NZART officers or club members.

However, in order to save the RSM group a great deal of time and effort in terms of conducting an investigation, the NZART MS Co-ordinators collate the required information and verify its authenticity before submitting it. We are then prepared to answer any questions the RSM Inspector or Manager may ask with respect to our submission. This approach has worked very successfully within New Zealand.

Reporting International Intruders to the IARUMS Region 3 Co-coordinator

The MS Co-ordinators collate the required information and verify its authenticity before submission an intruder report to the IARUM MS Co-ordinator for Region 3 (Peter – VK3MV). He then collates the information and verifies the information received from other Region 3 reports before making a formal submission to the responsible Telecommunication Authority (TA) as a formal complaint. The procedure used by the Wireless Institute of Australia is: http://www.wia.org.au/members/intruder/about/

Details on how to contact the IARUMS R3 Regional MS Coordinator are available via the NZART Monitoring Service web links: http:// http://www.nzart.org.nz/ms/index.html

How to contact us

NZART Monitoring Service relies heavily on your reports. We do not handle complaints by amateurs against other amateurs, which are for the National Society or the NZ radio authorities to deal with. However, we do deal with pirates, commercial broadcasters and other non amateur intruders who, for whatever reason, cause interference on the exclusive amateur bands. A vast amount of work by many dedicated individuals and groups over many decades has gone into making the amateur service what it is today. We, the present generation of radio amateurs, have a responsibility to help keep it that way for ourselves and future generations. One of the most important ways we can do this is to report intruders into our exclusive bands. The longer we ignore them, the harder it will be to remove them. Do nothing and we may gradually lose the right, not just the ability, to use the amateur bands due to intrusions.

Please report intruders as soon as possible after you log them, using email if possible as that allows us to act quickly. You can email the NZART MS co-ordinator or deputy directly, or send a message to one of the general ZL amateur email reflectors (such as KiwiDX or ZLhams) but it is better to submit reports to the email reflector set up for this specific purpose, namely IntruderWatch@GoogleGroups.com. You are very welcome to join the Intruder Watch group – visit http://groups.google.com/group/IntruderWatch to apply–and help us by reporting and/or characterising intruders.

If you don't have access to email, please submit your reports to either of us by telephone or even by post:

NZART Monitoring Service Co-ordinator
John Martin ZL1GWE
57 Crescent Road East
Palm Beach, Waiheke Island
Auckland 1081
Telephone: 09 372 7878 (home)
09 397 8634 (work)
021 744 012 (mobile/SMS text)
E-mail: MS@NZART.org.nz or John.Martin@NZ.IBM.com or jrmvk8jr@xtra.co.nz

NZART Monitoring Service Deputy Co-ordinator
Dr Gary Hinson ZL2IFB
Castle Peak, 1262 Taihape Road
RD9 Hastings 4179
Telephone: 06 874 3344
E-mail: MS2@NZART.org.nz or gary@G4iFB.com

ITU CLASSES OF EMISSION CODE

The basic characteristics of radio emissions are usually given in a three symbol group, such as A1A for Morse code.
These symbols are arrived at as follows:
First symbol—type of modulation of the main carrier.
Second symbol—nature of signal(s) modulating the main carrier.
Third symbol—type of information to be transmitted.
Modulation used only for short periods and incidental purposes, such as identification, may be ignored.

1. First symbol—type of modulation of main carrier

- 1.1 Emission of an unmodulated carrier — N
- 1.2 Emission in which the main carrier is amplitude modulated, including angle-modulated sub-carriers—
  - 1.2.1 Double-sideband — A
  - 1.2.2 Single-sideband, full carrier — H
  - 1.2.3 Single-sideband, reduced or variable carrier — R
  - 1.2.4 Single-sideband, suppressed carrier — J
  - 1.2.5 Independent sidebands — B
  - 1.2.6 Vestigial sideband — C
- 1.3 Emission in which the main carrier is angle-modulated—
  - 1.3.1 Frequency modulation — F
  - 1.3.2 Phase modulation — G
- 1.4 Emission in which the main carrier is amplitude and angle-modulated either simultaneously or in a pre-established sequence — D
- 1.5 Emission of pulses—
  - 1.5.1 Sequence of unmodulated pulses — P
  - 1.5.2 A sequence of pulses—
    - 1.5.2.1 Modulated in amplitude — K
    - 1.5.2.2 Modulated in width/duration — L
    - 1.5.2.3 Modulated in position/phase — M
    - 1.5.2.4 In which the carrier is angle-modulated during the period of the pulse — Q
    - 1.5.2.5 Combination of the above — V
- 1.6 Cases not covered above in which an emission consists of the main carrier modulated in a combination of angle, amplitude, or pulse — W
- 1.7 Cases not otherwise covered — X

2. Second symbol: nature of signals modulating the main carrier—

2.1	No modulating signal	0
2.2	A single channel containing quantized or digital information, without the use of modulating sub-carrier*	1
2.3	A single channel containing quantized or digital information, with the use of a modulating sub-carrier*	2
2.4	Single channel containing analogue information	3
2.5	Two or more channels containing quantized or digital information	7
2.6	Two or more channels containing analogue info	8
2.7	Composite system with quantized or digital information together with analogue information	9
2.8	Cases not otherwise covered	X

*This excludes time-division multiplex.

3. Third symbol—type of information to be transmitted

3.1	No information transmitted	N
3.2	Telegraphy—for aural reception	A
3.3	Telegraphy—for automatic reception	B
3.4	Facsimile	C
3.5	Data transmission, telemetry, telecommand	D
3.6	Telephony—including sound broadcasting	E
3.7	Television (video)	F
3.8	Combination of above	W
3.9	Cases not otherwise covered	X

For a more complete description, the three symbol group may be preceded by a four symbol group representing the necessary bandwidth. This group must comprise three numerals and one letter, which must be H, K, M, or G. The letter is placed at the position of the decimal point in the number denoting the bandwidth in hertz, kilohertz, megahertz or gigahertz respectively.

The calculation of necessary bandwidths is complicated and only a few examples can be covered here. For CW Morse, the baud rate is 0.8 times the words per minute. The bandwidth is three or five times the baud rate, depending on the absence or presence of QSB. SSB Phone is just the highest modulating frequency. Double it for AM. FSK, RTTY (any code) is the baud rate plus 1.2 times the frequency shift.

Optionally, two more symbols may be added to the basic characteristics of emissions.

The optional additional characteristics are:

Fourth symbol—details of signal(s).

Fifth symbol—nature of multiplexing.

1. Fourth symbol — details of signal(s)

1.1	Two-condition code with elements of differing numbers and/or durations	A
1.2	Two-condition code with elements of the same number and duration without error-correction	B
1.3	Two-condition code with elements of the same number and duration with error-correction	C
1.4	Four-condition code in which each condition represents a signal element (of one or more bits)	D
1.5	Multi-condition code in which each condition represents a signal element (of one or more bits)	E
1.6	Multi-condition code in which each condition or combination of conditions represents a character	F
1.7	Sound of broadcasting quality (mono)	G
1.8	Sound of broadcasting quality (stereo)	H
1.9	Sound of commercial quality (excluding categories K and L)	J
1.10	Sound of commercial quality with the use of frequency inversion or band-splitting	K
1.11	Sound of commercial quality with separate FM signals for level control	L
1.12	Monochrome television or facsimile	M
1.13	Colour television or facsimile	N
1.14	Combination of the above	W
1.15	Cases not otherwise covered	X

2. Fifth symbol—nature of multiplexing

2.1	None	N
2.2	Code-division multiplex (including bandwidth expansion techniques)	C
2.3	Frequency-division multiplex	F
2.4	Time-division multiplex	T
2.5	Combination of F and T	W
2.6	Other types of multiplexing	X

Examples

25 wpm Morse on a local net:	060HA1AAN
25 wpm Morse on a DXpedition:	100HA1AAN
Classic HF Baudot RTTY:	1K07F1BBN
SSB Phone:	2K85J3EJN
AM Phone:	5K70A3EJN
So-called FM Phone on VHF:	16K0G3EJN
1200 baud Packet on VHF:	16K0G2DCN
9600 baud Packet on VHF:	13K2F1DCN
GPS satellite navigation:	100KG7DCC
On/off keyed Hellschreiber:	050HV1CAN

ITU EMISSION EXAMPLES

First example: Continuous wave telegraphy, Morse code, CW

Where Bn = Necessary bandwidth in hertz

Where bandwidth formulae is: Bn = BK or (B times K)

B = Modulation rate in bauds

K = an overall numerical factor which varies according to the emission and which depends upon the allowable signal distortion (K= 5 for fading circuits and K = 3 for nonfading circuits)

How do you convert 25 Words per Minute (WPM) into bauds?

Officially the speed in bauds is the reciprocal of the duration of the shortest or smallest telegraph element, when timed in seconds.

The standard way to do this is to send an agreed standard word consisting of five characters, which happens to be "PARIS" for timing purposes. Which if you count it out is equal to 49 timing units, based on the fact that a dit is the shortest unit. The length of a dah is 3 units; the space between dits and dahs is 1 unit. The space between characters is 3 units and the space at the end of the word is 6 units. As a result, if WPM is equal to 49W symbols per minute. So 49W/60 equals 0.81666 W symbols per second. Therefore 25 WPM x 0.81666 equals 20 Bauds.

25 WPM: B = 20, K = 5, Bandwidth: 100Hz

So the designation of emission becomes: **100HA1AAN** or simplified to **A1A**

Note: the fourth symbol is a two condition code with elements of differing numbers and/or durations

The fifth symbol is None.

Second example: Telephony, double-sideband (single channel) – broadcast station

Where M = Maximum modulation frequency in hertz

Where the Bandwidth formulae is: Bn = 2M or (2 times M)

If M = 3000, the resultant bandwidth 6000 Hz = 6 kHz

So the designation of emission becomes: **6K00A3EJN** or simplified to **A3E**

What happens in the case of a Single Sideband transmission with a suppressed carrier (single carrier)? See third example below.

Third example:

In this case Bandwidth Bn = M (Modulation) minus the lowest modulation frequency

So if M = 3000. The lowest modulation frequency is 300 Hz. The resultant bandwidth 2700 Hz = 2.7 kHz

So the designation of emission becomes: **2K70J3EJN** or simplified to **J3E**

Note: the fourth symbol is: J – Sound of commercial quality (excluding categories given in sub-paragraphs 1.10 and 1.11)
Fifth symbol is: None
Note: Although J3E is Single Sideband it is really is useful to distinguish between Lower Sideband and Upper Sideband i.e. J3E/L or J3E/U as the frequency offset will be different in each case.

Fourth example: Commercial telephony using Frequency Modulation

Where Bandwidth formulae is:
Bn = 2M + 2DK
D = Peak deviation i.e. half the difference between the maximum and minimum values of the instantaneous frequency. The instantaneous frequency in hertz is the time rate of change in phase in radians divided by 2 pi (where pi equals 3.14159)
K = 1
If D = 5000 Hz, M = 3000. The resultant bandwidth 16000 Hz = 16 kHz
So the designation of emission becomes: **16K0F3EJN** or simplified to **F3E**
Note: the fourth and fifth symbols are the same as above

Fifth Example: PSK31 or BPSK31

The necessary bandwidth is 60H0 or 60 Hz. The originator of PSK31 refers to a bit rate of 31.25 bauds or a bit rate of 31.25 per second, this equates to approximately 35 Word Per Minute in terms of speed. The necessary bandwidth required equates to 2BK. Where B relates to bit rate per second or Modulation rate in baud and K is a factor of 1. Therefore the necessary bandwidth required is 62.50 Hz or 62H5 – however most papers refer to the necessary bandwidth as 60H0.
The correct mode is G1B. There are two modes with PSK31 either Binary Phase Shift Keying (BPSK) or Quadrature PSK. I noticed that the ARRL show the designator of emission as J2B (BPSK) or J2D (QPSK), based on the normal method used on the air i.e. SSB or LSB.
The ITU designation of emission for BPSK31 is 60H0G1B— and 60H0G1D— for QPSK31. However the complete designation of emission for BPSK31 is:
60H0G1BBN. QPSK31 is 60H0G1DCN, which uses error correction.

MFSK16

In the case of MFSK16, the emission designator, the ITU calculations are as follows:
BW = B + M. S.K (where B equals baud rate, M is the number of tones, and S is the tone spacing, K is factor related to keying technique (K equals 1.2 for coherent phase keying or hard keyed FSK)). Using the following example: taken from ZL1BPU:
Symbol Rate = 15.625 baud
Channel Data Rate = 15.625 x log216 = 15.625 x 4 = 62.5 BPS
User Data Rate = 62.5 x 1/2 (Forward Error Rate or FEC Rate) = 31.25 BPS
Text Throughput (CPS) = 31.25 / 10 CPS = 3.125 CPS
Text Throughput (WPM) = 31.25 x 60 / (10 x 6) = 31.25 WPM
Tone spacing is 15.625 Hz
So BW = 15.625 + 16 x 15.625 x 1.2 = 315.625 Hz
Where CPS is Characters Per Second, WPM is Words Per Minute and BPS is Bits Per Second. So the necessary bandwidth becomes 316H. The designation of emission becomes 316HF1B— using the appropriate tables. The designation of emission becomes 316HF1BCN (error correction included).

Appendix – Frequency measurement

http://en.wikipedia.org/wiki/Frequency
A1E- Centre frequency of emission
A3E – Broadcast Stations – Centre frequency of emission and bandwidth taken
Emission Measure frequency at F1B/RTTY Centre frequency or halfway between the two carriers
F3E/FM Resolution frequency of the modulation
F3C Centre frequency of emission
F7B Centre frequency of the four carriers
FXX Centre frequency of emission
G7D Beginning, Centre frequency of emission and End often heard on 30 Metre band
M7D Beginning, Centre frequency of emission and End – note Pulse Repetition Frequency (PRF)
http://em.wikipedia.org/wiki/Radar
JAM Centre frequency of emissions
QXX Beginning, Centre frequency of emission and End
J3E Upper or Lower Resolution frequency of the sideband i.e. J3E/L or J3E/U
J8E Resolution frequency of the two sidebands
N0N Zero beat of carrier
P0N or PXX – Beginning, Centre frequency of emission and End – often used by Over The Horizon Radar
VXX – Beginning, Centre frequency of emission and End – often used by Coastal Ocean Dynamics Applications Radar (CODAR)

IARU INTERNATIONAL AMATEUR RADIO UNION

NZART IARU LIAISON OFFICER: **JOHN LOCKHEAD** ZL4QS
IARU REGION 3 LIAISON DIRECTOR: **PETER LAKE** ZL2AZ
COMMITTEE: NZART PRESIDENT: **ROY SYMON** ZL2KH
TERRY CARRELL ZL3QL
FMTAG CHAIRMAN: **DAVID ANDREWS**
NZART ALO: **DON WALLACE** ZL2TLL
FRED JOHNSON ZL2AMJ

Where do I fit in?

As a radio amateur, your NZART Membership is vital to all of us. Amateur Radio is an activity requiring international coordination in radio frequency spectrum matters. This is achieved through several international organizations and your support is needed.
Membership of NZART acknowledges importance for the continuance of amateur radio in New Zealand, of representation by radio amateurs to government and liaison between NZART and overseas amateur radio societies.

ITU — the International Telecommunication Union

The ITU is a United Nations Agency and can be viewed as an assembly of government representatives. See the ITU web page at <www.itu.int>. New Zealand is a Member and the New Zealand Administration is the Ministry of Economic Development. The MED spectrum management web page is at <www.rsm.govt.nz/csm>.
Through its International Radio Regulations, the ITU allocates radio services to specific frequency bands. Member states are required to recognize these treaty provisions when licensing services to operate on specific frequencies within their own regulations and national boundaries. The ITU Radio Regulations also define the Amateur Service and the Amateur Satellite Service and set down other operating requirements.
Frequency band allocations and the International Radio Regulations themselves are reviewed at ITU World Radiocommunication Conferences (WRC).
The New Zealand Radio Regulations reflect the International Radio Regulations.

The International Amateur Radio Union (IARU)

The IARU is a Sector Member of the ITU where it represents the Amateur Services. It is recognized by administrations as the appropriate body to make recommendations on amateur radio issues. The IARU is permitted to present papers for the information of ITU conferences.
The IARU is a worldwide voluntary federation of more than 150 amateur radio societies, founded in 1925. New Zealand joined in 1929. The prime purpose of the IARU is the protection of the Amateur and Amateur Satellite Services. The IARU Constitution is at the IARU web page: <www.iaru.org>.
The IARU is co-ordinated by an Administrative Council (AC) comprising a President, Vice-President, and two representatives from each of the three Regions:
Region 1 covers Europe, Russia and Africa, Region 2 the Americas, and Region 3 the remainder including New Zealand and Asia Pacific area.
One society provides the IARU Secretary and the IARU International Secretariat (IS) administrative services. Currently this is the American Radio Relay League (ARRL).
The business of IARU is transacted at triennial regional conferences arranged in sequence so that one is held each year. The IARU member-societies of the Region meet at these regional conferences to discuss common problems, to find solutions, to

determine policy, and promote international amateur radio.
Each Region has its own IARU regional organization. NZART is a founder and active member of IARU Region 3.
Founded in 1968, the IARU Region 3 Secretariat is in Tokyo. The affairs of the Region are attended to between conferences by Directors who are elected at the triennial conference.

NZART

Founded in 1926, NZART is the New Zealand society. The IARU Constitution recognizes only one member-society in each country. NZART is duty-bound to represent the interests of the Amateur and Amateur Satellite Services.
NZART is recognised by and makes representations to the New Zealand Administration, the Ministry of Economic Development, on behalf of itself and the IARU.
NZART also makes presentations to IARU Regional Conferences and can influence IARU policies.

IARU representatives at ITU conferences

The IARU is represented at ITU conferences by a selected team of specialists in amateur radio affairs drawn from IARU societies worldwide.
For some important ITU conferences, a representative of the Amateur Service is included in national delegations from Member countries. Where appropriate, NZART finances an Amateur Service representative in New Zealand's delegation. There was an NZART representative on the New Zealand Delegations to ITU conferences in 1979, 1982, 1997, 2003 and 2006.
The International Amateur Radio Union (IARU) Region 3, 14th Triennial Conference was held on 12-16 October, 2009 hosted by the NZART in Christchurch, New Zealand.
Delegates from 10 member societies (ARRL, ARSI, CRSA, HARTS, JARL, KARL, NZART, ORARI, SARTS and WIA) attended, with RAST, RSGB and VARC being represented by proxy. Also attending was the IARU President Tim Ellam VE6SH and Vice President Ole Garpestad LA2RR, from Region 1 President Hans Timmerman PB2T and Secretary Dennis Green ZS4BS and Region 2 Secretary Ramon Santoyo XE1KK.
The IARU R3 Directors had identified two topics, the IARU Monitoring System, and emergency communications, as being highly important, and major decisions were made on both of them.

The International Radio Regulations

A copy of the text of the regulations pertaining to Amateur Radio can be obtained on request from NZART Headquarters or from the "Study Guide" found at the NZART web page. A full copy of the Radio Regulations is available from the ITU Geneva but occupies several volumes. It is also available on CD-ROM, and is expensive.
The International Radio Regulations do not of themselves regulate radio amateurs. With the status of an international treaty, they set out what administrations are expected to impose by their own national regulations.

International challenges for amateur radio

All classes of radio service compete for their share of the radio frequency spectrum. Most services wield strong influence at ITU conferences. Decisions made there are affected by many factors, political, economic and social. At times the conference atmosphere is hostile to amateur radio.
Some decisions take many years to implement. The patient pursuit of long-term policies is needed to ensure the future welfare of the Amateur and Amateur Satellite Services.
The cost of this continuing vigilance is high. It comes from the radio amateurs in national societies and from the devoted voluntary efforts by many amateur radio specialists. A part of your NZART subscription is remitted to IARU Region 3 each year to help fund international activities.
Remember, there is no actual security for the Amateur or Amateur Satellite Service. Constant vigilance, with time and money to protect our regulatory provisions are needed.

Further information

Enquiries on international radio matters are welcome at NZART Headquarters.
See the IARU web site at <www.iaru.org> and the Region 3 web site at< www.iaru-r3.org>. Both can be accessed via <www.nzart.org.nz>.

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AMATEUR RADIO EXAMINATIONS

General

The amateur Service is defined in the Radio Regulations as: a radio-communication service for the purpose of self training, inter communication and technical investigations carried out by amateurs, that is by duly authorised persons interested in radio technique solely with a personal aim and without pecuniary interest.

In accordance with Article 25.6 of the International Telecommunications Union Radio Regulations regarding technical and operational qualifications of amateur stations, a person operating an amateur station (whether the licensee or other person authorised by the licensee) must be the holder of a General Amateur Operator's Certificate granted in accordance with the Radiocommunications Regulations 2001.

There is now only one New Zealand amateur radio licence: General Amateur Radio Operator Licence.

Examination structure

There is only one Amateur Radio Examination. It is a sixty-question multiple-choice written examination in: radio regulations, the principles of electricity, radiotelegraphy, and radiotelephony; operating procedures, service codes and abbreviations as are applicable to the amateur service; and in the adjustment and operation of radio apparatus used in a typical amateur radio station. The sixty questions are randomly-selected by computer from a 600-question public-domain question-bank to form an examination paper. Every exam paper is different.

Study Courses Training materials and a book showing all the 600-questions are available from NZART at the address given below. See the NZART web page: <www.nzart.org.nz>.

Requirements for certificates

Forty correct answers are required for a pass.

Taking the examination

The Examination Division of NZART conducts examinations on behalf of the Ministry of Economic Development Radio Spectrum Management group (MED RSM).

The date, time and place for the examination are by mutual arrangement between the supervisors and the candidates. The allowed time for the examination is two hours, with an extra reading time of ten minutes.

Applications for examinations

Applications for all examinations should be made to your local examination supervisor. A list of supervisors can be found on the NZART web page or from NZART Headquarters. The supervisors expect you to contact them.

Examination fees

A fee of $5 is required to accompany the examination application. Should you fail the first time and wish to re-sit, there is no further fee.

Examination result notification

If you are successful you will receive an Examination Result Notification (ERN) form direct from the examiners. On completion of a Radio 4A Application Form, please forward the ERN and the application form to NZART on the address listed on the form together with $95 which includes a one year membership to NZART.

Examination recounts

Applications for recounts of the marks awarded must be made to the NZART Examination Division no later than one month after the examination in respect of which mark in question was awarded.

Call-signs

Your licence gives your call-sign. Application may also be made for a specific radio call-sign, if not already allocated.

Further enquiries

Please direct any enquiries about the Amateur Radio Examination to: NZART Examination Division, PO Box 40-525, Upper Hutt 6415.

Telephone (+64 4) 939-2189, Fax (+64 4) 939-2190. E-mail <exam@nzart.org.nz>.

Morse code

Competency in the Morse code is not needed for a licence. NZART provides a Morse test for travellers to countries requiring evidence of Morse competency for reciprocal licensing. Tests are also available by mutual arrangement for individual challenge purposes.

A certificate of achievement is available from Morse testing supervisors on attaining a speed of five words per minute or higher, sending and receiving. The test details are available on application.

Note to branches

The NZART Morse Testing Service is managed by the Examination Co-ordinator, an officer of the Association. The Morse tests are administered by participating NZART Branches. Branches are responsible for choosing a Morse Tester and a Scrutiniser from the members of their Branch. These persons should be members of NZART. NZART requires the names, call signs and contact details of the persons the Branch nominates to these roles, with this information annually updated. The Examination Co-ordinator will appoint the Morse Examiners. Each is given registration number.

A candidate is to contact a local Morse Tester. The Tester will arrange a date for the test. The test text pieces will be computer-generated in Farnsworth format. Each Branch is responsible for providing the necessary hardware, computer, oscillator, key and earphones as required. There is no fee for a Morse test.

Radiocommunications Regulations (General User Radio Licence for Amateur Radio Operators) Notice 2010

Pursuant to section 111 of the Radiocommunications Act 1989 and Regulation 9 of the Radiocommunications Regulations 2001, and acting under delegated authority from the chief executive, I give the following notice.

Notice

1. Short title and commencement — (1) This notice is the Radiocommunications Regulations (General User Radio Licence for Amateur Radio Operators) Notice 2010.

(2) This notice comes into force on 12 August 2010 .

2. General user radio licence — A general user radio licence is granted for the transmission of radio waves by amateur radio operators in New Zealand, for the purpose of communications in the amateur radio service in accordance with the terms, conditions and restrictions of this notice.

3. Terms, conditions and restrictions applying to New Zealand amateur operators — (1) Persons who hold a General Amateur Operator's Certificate of Competency and a call-sign issued pursuant to the Regulations may operate an amateur radio station in New Zealand.

(2) The call-sign prefix of "ZL" may be substituted with the prefix "ZM" by the call-sign holder for the period of, and participation in, a recognised contest, or as the control station for special event communications.

(3) Operation on amateur bands between 5 MHz and 25 MHz is not permitted unless a person has held a General Amateur Operators Certificate of Competency for three months and logged 50 contacts during this period. The person must keep the logbook record for at least one year and, during this period, produce it at the request of the chief executive.

4. Terms, conditions and restrictions applying to visiting amateur operators — (1) Persons visiting New Zealand who hold a current amateur certificate of competency, authorisation or licence issued by another administration, may operate an amateur station in New Zealand for a period not exceeding 90 days, provided the certificate, authorisation or licence meets the requirements of Recommendation ITU-R M.1544 or CEPT T/R 61-01 or CEPT T/R 61-02 and is produced at the request of the chief executive.

(2) The visiting overseas operator must use the national call-sign allocated by the other administration to the operator, in conjunction with the prefix or suffix "ZL" which is to be separated from the national

call-sign by the character "/" (telegraphy), or the word "stroke" (telephony).

5. Terms, conditions and restrictions applying to all amateur operators—(1) The use of call-signs, including temporary and club call-signs, must be in accordance with publication PIB 46 "Radio Operator Certificate and Call-sign Rules" published at www.rsm.govt.nz.

(2) Call-signs must be transmitted at least once every 15 minutes during communications.

(3) National and international communication is permitted only between amateur stations, and is limited to matters of a personal nature, or for the purpose of self-training, intercommunication and radio technology investigation, solely with a personal aim and without pecuniary interest. The passing of brief messages of a personal nature on behalf of other persons is also permitted, provided no fees or other consideration is requested or accepted.

(4) Communications must not be encoded for the purpose of obscuring their meaning, except for control signals by the operators of remotely controlled amateur stations.

(5) Except as provided to the contrary in this notice, transmitter power output must not exceed 500 watts peak envelope power (pX), as defined in ITU Radio Regulation 1.157.

(6) Amateur stations must, as far as is compatible with practical considerations, comply with the latest ITU-R recommendations to the extent applicable to the amateur service.

(7) In accordance with Article 25 of the International Radio Regulations, amateur operators are encouraged to prepare for, and meet, communication needs in support of disaster relief.

(8) Amateur beacons, repeaters and fixed links may not be established pursuant to this licence.

(9) Unwanted emissions outside the frequency bands specified in this schedule must comply with the requirements of technical standard ETSI ETS 300 684 published by the European Telecommunications Standards Institute (ETSI).

(10) This general user radio licence applies only to transmissions within the frequency ranges set out in the Schedule to this licence. All such transmissions must be made in accordance with the notes for the frequency range in which that transmission take place and in accordance with the other conditions set out in this licence.

6. Consequential revocation of licences — The Radiocommunication Regulations (General User Radio Licence for Amateur Radio Operators) Notice 2010 dated the 9th day of February 2010 and published in the New Zealand Gazette, 18 February 2010, No. 18, page 430, is revoked.

Schedule

Frequency Range	Notes
130 to 190 kHz	2, 4, 6
505 to 515 kHz	2, 4, 7, 8
1.80 to 1.95 MHz	2
3.50 to 3.90 MHz	2
7.00 to 7.10 MHz	1
7.10 to 7.20 MHz	
7.20 to 7.30 MHz	2
10.10 to 10.15 MHz	2
14.00 to 14.35 MHz	1
18.068 to 18.168 MHz	1
21.00 to 21.45 MHz	1
24.89 to 24.99 MHz	1
26.95 to 27.30 MHz	2, 3, 5, 6
28.00 to 29.70 MHz	1
51.00 to 53.00 MHz	2
144.00 to 146.00 MHz	1
146.00 to 148.00 MHz	2
430.00 to 440.00 MHz	1, 2, 3
921.00 to 928.00 MHz	3, 7
1.24 to 1.30 GHz	1, 2
2.396 to 2.45 GHz	1, 3
3.30 to 3.41 GHz	1, 2
5.65 to 5.85 GHz	1, 3
10.00 to 10.50 GHz	1, 2
24.00 to 24.05 GHz	1, 3
24.05 to 24.25 GHz	3
47.00 to 47.20 GHz	1
75.50 to 76.00 GHz	1, 2
76.00 to 81.00 GHz	1, 2
122.25 to 123.00 GHz	2, 3
134.00 to 136.00 GHz	1
136.00 to 141.00 GHz	1,2
241.00 to 248.00 GHz	1, 2, 3
248.00 to 250.00 GHz	1
275.00 to 1000 GHz	2, 4

Notes to Schedule

1. The following ranges of frequencies may also be used for amateur satellite communications:

7.00 to 7.10 MHz	3.40 to 3.41 GHz
14.00 to 14.25 MHz	5.65 to 5.67 GHz (a)
18.068 to 18.168 MHz	5.83 to 5.85 GHz (b)
21.00 to 21.45 MHz	10.45 to 10.50 GHz
24.89 to 24.99 MHz	24.00 to 24.05 GHz
28.00 to 29.70 MHz	47.00 to 47.20 GHz
144.00 to 146.00 MHz	75.50 to 81.00 GHz
435.00 to 438.00 MHz	134.00 to 141.00 GHz
1.26 to 1.27 GHz (a)	241.00 to 250.00 GHz
2.40 to 2.45 GHz	

(a) Limited to the earth-to-space direction.

(b) Limited to the space-to-earth direction.

2. These frequencies are, or may be, allocated for use by other services. Amateur operators must accept interference from, and must not cause interference to, such other services.

3. The frequencies:

27.12 MHz	(26.957 – 27.283 MHz),
433.92 MHz	(433.05 – 434.79 MHz),
921.5 MHz	(915 – 928 MHz),
2.45 GHz	(2.4 – 2.5 GHz),
5.8 GHz	(5.725 – 5.875 GHz),
24.125 GHz	(24.00 – 24.25 GHz),
122.5 GHz	(122 – 123 GHz); and
245 GHz	(244 – 246 GHz)

are designated for industrial, scientific and medical (ISM) purposes. These frequencies may also be allocated to Short Range Device (SRD) services. Amateur operators must accept interference from ISM and SRD services within these frequency ranges.

4. Allocated to the amateur service on a temporary basis until further notice.

5. Telecommand and telemetry operation only.

6. Radiated power must not exceed 5 watts e.i.r.p.

7. Radiated power must not exceed 25 watts e.i.r.p.

8. The bandwidth of emissions must not exceed 200 Hz.

Dated at Wellington this 12th day of July 2010. SANJAI RAJ, Group Manager, Radio Spectrum Management, Ministry of Economic Development.

Explanatory Note

This note is not part of the notice, but is intended to indicate its general effect.

This notice:

1. Prescribes that, pursuant to Regulations made under the Radiocommunications Act 1989, a general user radio licence is granted for the transmission of radio waves by of communications in the amateur radio service, in accordance with the terms, conditions and restrictions of this notice. This notice comes into force on 12 August 2010 .

2. This notice replaces the Radiocommunications Regulations (General User Radio Licence for Amateur Radio Operators) Notice 2010. The principal change from that notice is the deletion of the frequency range 928 MHz to 929 MHz from the Schedule.

CHANGE OF ADDRESS NOTIFICATION:

Please send to the Business Manager any details of your new address to retain your membership benefits. Advise the Ministry of Economic Development (Radio Spectrum Management) or change your address online (refer Call-sign section).

REMEMBER: If you change your address you must notify the nearest office of the Ministry of Economic Development (Radio Spectrum Management), AND the Business Manager, NZART.

NZART QSL BUREAU

The NZART QSL Bureau is one of a network of approximately 170 bureaux established by the IARU to facilitate the exchange of QSL cards between NZART members and radio amateurs and listeners throughout the world.

Outward QSL cards

The service is free to both transmitting and non-transmitting members of NZART—**non-members** may make use of this service at a cost of **25c per card.** All QSL cards for forwarding to radio amateurs and listeners in New Zealand and overseas countries should be posted to:
The QSL Manager, NZART QSL Bureau, PO Box 857, Wanganui Mail Centre, WANGANUI 4540.
The call-sign of the station to which the card is addressed should be **printed clearly on both sides** of each card. Are you sending your card to a DX-station's Manager? If so, please write the Manager's call on the back of the cards. (Cards are sorted using the call printed on the back of the card.) If you see fit not to write the recipients' call-signs on the back of your cards, it is pointless to carry out the last instruction–we are not clairvoyants! When writing call-signs onto your cards, please take care with the forming of the letters and numbers.
Make sure that the letter V will read V, not U, an "S" looks like an ess and not the figure "5" and vice versa, etc. This will greatly help the Bureau staff in their sorting! Remember also that English is not the first language of everybody handing and receiving your cards!
Please sort your QSL cards into New Zealand call-district order (ie ZL1-ZL2-ZL3-ZL4), USA call-district order (USA prefixes are kept together–A-K-N & W1 cards all go to their First District Bureau; likewise all A-K-N-W2 cards go to the Second District Bureau and so on), and all others in alphabetical order: eg CE, EA, ES, EU, G/M, I, OK, S5, SM, UA, UN, UR, W1-W2-W3, etc, VU, ZL1-ZL2-ZL3-ZL4, 3D, 5W, 9A etc. **Please do not separate countries with rubber bands, strips of paper etc.**
Members must enclose a current year *Break-In* label with each posting. After complying with the above, sit back and be patient!

Inward QSL cards

The NZART QSL Bureau provides a **free inward service for all New Zealand amateurs and listeners.**

Collecting cards from the sub-bureaux by members and non-members

Please note that the four New Zealand sub-bureaux are arranged to cover the four mainland prefixes. A ZL1 living anywhere in New Zealand deals with the ZL1 sub-bureau, ZL2s likewise with the ZL2 sub-bureau. and so on through to the ZL4s. Supply your particular QSL sub-bureau (listed below) with a supply of suitable size self addressed stamped envelopes (SASEs) to receive your incoming cards. Envelopes should be numbered and "Last Envelope" marked on one so that you are reminded when to renew the supply. Please make sure that you include your call-sign on the front of your envelopes as each sub-bureau only deals with call-signs and not with operators' names. Any specific requests for forwarding cards should be printed on the back of the envelopes: for example "send monthly" or "send when there are 10 cards" etc.
Some Branches have special arrangements for "Branch postings" in place with the appropriate sub-manager. Contact your local Branch secretary for information. (The possible provision of this service is totally the prerogative of each individual sub-manager and there is no compulsion on any person to be a party to any such collective scheme.)

QSL sub-managers

- ZL1: Mr Ian Walker ZL1BFB, PO Box 163060, Lynfield, AUCKLAND 1443
- ZL2: Mr A. H. Marr ZL2AGY, 8 Campbell Street, HAWERA 4610
- ZL3: Mr K. A. Holdom ZL4HU, P.O. Box 7, CLYDE 9341
- ZL4: Mr D. A. Adams ZL4OZ, 26 Wills Street, Balaclava, DUNEDIN 9016

Your QSL Card

1 **Should not exceed 140 × 90mm** in size.
2 Have all the necessary information on one side of the card — if you intend having a two-sided card, make sure your call-sign is printed on **both** sides.
3 Use Universal Co-ordinated lime (UTC) (formerly referred to as GMT, also referred to as Zulu time)—New Zealand Standard time (NZST) or New Zealand Daylight Saving Time (NZDT) is meaningless to 99.9 per cent of amateurs—and you do want a card back from them!
4 It is advisable to write out the name of the month to avoid confusion.
5 **Do not correct mistakes—make out a new card.** Altered cards are valueless to the recipient. Any further information concerning the business of the QSL Bureau, or requests for info on DX station QSL Managers/direct mail addresses (we will do our best to assist!) can be obtained from the QSL Manager at P0 Box 857, Wanganui Mail Centre, WANGANUI 4540 or e-mail <zl2rr@xtra.co.nz>.

PS! Special calls and DXpeditions

If you, or your Branch, put on a special event/contest station using a special call-sign allocation for the duration thereof, or partake in a DXpedition, please notify the QSL Bureau Manager and supply him with the relevant QSL Manager info!

G-QRP CLUB

Devoted to Low Power Communication

Subscription; NZ $28 a year. Banked to ASB account 12-3011-0984272 -58 <www.gqrp.com.>

Membership Secretary; Tony G4WIF g4wif@gqrp.co.uk>, PO Box 298, Dartford, Kent DA1 9DQ, England.

Four copies of SPRAT magazines (Journal of the G-QRP-Club) posted every year and a copy of the Member's Handbook. Editor Rev George Dobbs G3RJV.

Club sales of books, parts and back issues of SPRAT (CD ROMs available from Graham Firth G3MFJ 13 Wynmore Drive, Bamhope, Leeds LS 16 9DQ, England. <G3mfj @ggrp.co.uk> Payments can be made in New Zealand to the NZ Club Agent; Phil Tarrant ZL2NJ.

For more information contact Phil Tarrant ZL2NJ <philtar@xtra.co.nz>

A Responsibility for all Radio Amateurs!

The amateur radio qualification is an achievable challenge for most people and is useful to career seekers in our technological world. It shows aptitude, a sincere interest in communications, and identifies an achiever. Which can give a jump over others in this competitive world. The late 1940s was a time with a wave of new entrants into amateur radio. Let us all try to promote a return to that level of interest! The NZART Council encourages newcomers into Amateur Radio. This calls for the help of all radio amateurs.

As a challenge to all of us, the NZART Council has adopted the expression, "The New Wave", to embrace initiatives and objectives which will encourage new entrants to the world of amateur radio.

The NZART Constitution in its object statement says: "The objects of the Association shall be the maintenance and expansion of the Amateur Service in New Zealand by:

a) the encouragement of recruits into the Amateur Radio movement
b) the provision of guidance and instruction in radio techniques and operating
c) the promotion organisation and conduct of activities on a national and local basis ...",

These objects are further reflected in wording in the NZART Strategic Plan, in particular Objective 2, which states:

"To promote knowledge of amateur radio and encourage newcomers.

To assist Branches in local activities, especially in schools.

To provide education and training aids.

To award suitable prizes and other recognition."

And, in the plans of action:

"To publish information in Break-In, training materials and aids, educational and publicity material."

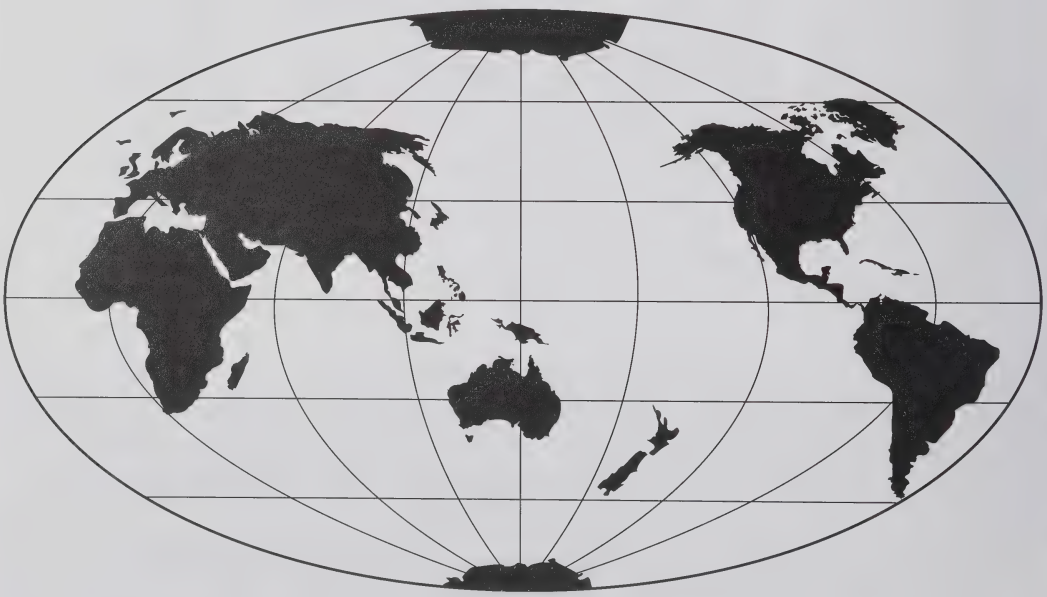
The NZART Strategic Plan Objective 3 states: "To provide guidance and instruction in radio techniques and operating, and encourage practical experimentation."

With your guidance and your help, others too can experience the thrills of Amateur Radio. Active encouragement and support are sought from all NZART members and Branches to recruit newcomers and to run classes in preparation for the amateur radio examination. Branches are encouraged to actively promote Amateur Radio. Master copies of brochures, posters and other leaflets and publicity material are available to Branches free of charge, from NZART Headquarters.

A sticker is available to NZART members from NZART Headquarters for 50c each. This is for displaying in the rear window of vehicles to show your support in a national campaign to increase the awareness of Amateur Radio in the general population. Many computer users are unaware of amateur radio and what it has to offer. You are encouraged to widely advertise the NZART World Wide Web page, <http://www.nzart.org.nz>

Simple-to-construct equipment is a way to show youth groups and other interested persons the fun of Amateur Radio. Show how inexpensive home-construction brings delight and excitement from the achievement of communicating without wires over long distances using self-built gear. Articles from Break-In may be freely photocopied and distributed for this purpose. Do you know anyone who has shown interest in Amateur Radio? A youth or grandchild perhaps? Spread the word by demonstration! After passing the amateur radio examination, a call-sign that is unique world-wide is issued by the Ministry of Economic Development. The challenge to attain such an identifying callsign brings its own rewarding fun. A local "group project", with the challenge to interest newcomers to develop their own local on-air amateur radio net, is worthy of consideration and encouragement. Construction of receivers, transmitters and other projects under the guidance of experienced constructors at "club workshop nights" is a worthy Branch activity. Each Branch should appoint an "NZART Agent" as one of their executive, the task being to gain increases in NZART members, both Transmitting and Non-Transmitting, in their local areas. A national and concerted effort by all New Zealand Radio Amateurs to promote Amateur Radio is necessary to ensure the continuation of a healthy and vigorous Amateur Service.

Help bring the "The New Wave" of radio amateurs!



A GUIDE TO VHF AND UHF FOR NEW LICENSEES

Jane Atkinson ZL2QO, Jim Meachen ZL2BHF, Stephen McNeill ZL4HG

This article has been prepared by those listed above on behalf of the Wellington VHF Group, Branch 74 NZART (Inc.), PO Box 12-259 Wellington, to offer guidance to the newcomer to the wonderful world of amateur radio.

"Sam the Mobile Man" guest appearance courtesy of Sue Lill

© August 1994

Why such an article?

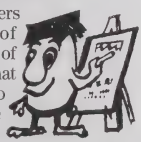
You've just got your licence. Your new rig has arrived today and is ready for use. You turn the power on. So, what do you do?

It can be pretty daunting when you first start out knowing what to say, or what not to say.

This article is designed to help you through your first few contacts. It's important to remember that there are no fixed rules. Many of the observations that are made in this article are the result of experiences we have had over a number of years, and you must remember that your operating may not necessarily cover what we've been interested in. So be it. This is a guide. Use it as a kind of à la carte offering of ideas.

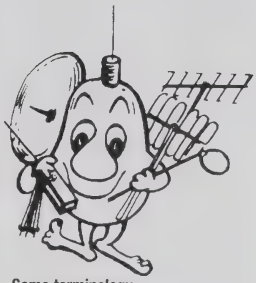
The only way to become familiar with the operating procedures on VHF or UHF is to spend some time listening to the good operators, noting how and why their methods succeed where those of the poor operator do not. It is quite important as newcomers that you should be discriminating in this respect, and not simply mimic what you have heard when going on the air for the first time. To summarize, copy the good operators, and not the bad ones!

How this article is written



The article covers a number of different facets of amateur radio that you are likely to encounter in the VHF spectrum. You'll find these are often the same ideas you'll use on HF, but that kind of operating is beyond the scope of this article. You can find some excellent books on the general topic of operating, and you're encouraged to seek out the information contained therein. Some good examples of operating books, all of which can be obtained from NZART Headquarters, are as follows:

- ★ A Guide to Amateur Radio, Pat Hawker G3VA, RSGB, Nineteenth Edition.
- ★ Amateur Radio Operating Manual, R. J. Eckersly G4FTJ, RSGB, Third Edition.
- ★ The ARRL Operating Manual, edited by Robert J. Halprin K1XA, ARRL, Third Edition.
- ★ AREC Manual, NZART, 1978.



Some terminology

There are lots of words that are used everyday in the world of VHF in amateur radio. Among the most common are as follows:

AM Amplitude Modulation. A method of voice encoding a transmission which is seldom used these days. Specifically the strength of the signal transmitted varies with the strength of the voice signal.

AMSAT Amateur Satellite Corporation. An amateur radio organization promoting and developing the amateur satellite service. Over two dozen satellites have been built by amateurs worldwide and are universally available.

APRS Automatic Position Reporting System. An amateur radio based automatic position reporting system for tracking and digitial communications.

AREC Amateur Radio Emergency Communications. Groups of amateurs within NZART Branches who provide emergency communications in conjunction with other organizations as the situations demand.

ATV Amateur Television. The transmission of video signals by radio amateurs. This transmission can sometimes take place through a special kind of repeater.

Autopatch A device for interfacing a repeater to a telephone line. Such a device responds to audio tones generated by a telephone touch-tone pad connected to the user's rig or microphone.

Break The word used to interrupt a conversation on a repeater, often to indicate there is an emergency.

Call Book An annual publication by NZART that contains amateur call-signs, frequency allocations, repeater maps and other vital operating information.

Channel The pair of frequencies, input and output, used by a repeater.

Clear Indicates the end of a contact.

Coverage area the geographic area within which a repeater provides communications (sometimes called the footprint).

CQ A general call made requesting someone to talk to.

CTCSS Continuous Tone Coded Squelch System. (Sometimes known as PL or Private Line.) A sub-audible tone system used when you want to activate just one or a small number of remote receivers.

CW Continuous Wave. Commonly known as Morse code. Used in weak signal or long distance applications and sometimes in conjunction with amateur satellites. This is an "on-off" or dot-dash type of transmission.

Data repeater A repeater specifically designed for use in passing data, rather than voice communications. Of course, it may be used for both.

Digipeater A Packet radio repeater. Packet radio is a form of data transmission. Voice cannot be transmitted through a digipeater.

Dropping out The situation that exists, while you are using a repeater, when your signal does not quite have enough strength to keep the repeater triggered (see "Trigger").

D-STAR Digital Smart Technologies for Amateur Radio. This is a digital voice and data protocol specification developed as the result of research by the Japan Amateur Radio League to investigate digital technologies for amateur radio.

DTMF Dual Tone Multi Frequency. A system often used for repeater control, using two tone frequencies. This control is often achieved by a simple keypad on your microphone or rig.

Duplex A mode of communication in which you transmit and receive simultaneously.

EchoLink A computer based Amateur Radio system that allows radio amateurs to communicate with one another using Voice over IP (VoIP) technology on the internet for at least part of the path between them.

FM Frequency Modulation. A method of voice encoding a transmission, which is frequently used in conjunction with repeaters. Specifically, the strength of the signal transmitted is constant but its frequency varies with the strength of the voice.

FTMAG Frequency Management and Technical Advisory Group. A group that advises NZART on technical matters, particularly those relating to VHF and repeaters.

Full quieting A received signal that contains no noise.

Handheld A portable receiver that is small enough to fit in the palm of your hand.

Handle This refers to your name. Note, the term "personal" is not generally used in amateur radio.**Horizontal polarization** The nominal orientation that a radiowave is taken to have as a result of an aerial's physical layout and orientation. Horizontal polarization is by convention very often used in weak signal applications at VHF/UHF.

Input frequency The frequency that the repeater receives on, and also the frequency on which you transmit to the repeater.

IRLP Internet Radio Linking Project. A project that links amateur radio stations around the world by using Voice over IP (VoIP). Each gateway consists of a dedicated computer running custom software that is connected to both a radio and the internet. This arrangement forms what is known as an IRLP Node.

Magnetic mount (Also **Mag Mount)** A mobile antenna with a magnetic base that enables quick installation and removal from a car.

Ministry of Economic Development (Radio Spectrum Division) Ultimately responsible for the administration of all the radio frequency spectrum in New Zealand.

NiCd (also **Nicad)** A Nickel-Cadmium battery that may be recharged.

NZART New Zealand Association of Radio Transmitters (Inc). New Zealand's national amateur radio society, PO Box 40-525, Upper Hutt.

Offset The difference between a repeater's transmit and receive frequencies. In New Zealand this is plus or minus 600 kHz on the 2 m band and 5 MHz on the 70 cm band.

Output frequency The frequency that the repeater transmits on, and also the frequency on

which your receiver receives the repeater.

Over The word used to indicate the end of a voice transmission.

Packet radio A way of transferring data or messages between amateurs across town, about the country or around the world.

Phone patch A device for interfacing the audio input and output of a radio transceiver to a telephone line.

RDF or **DF** **R**adio **D**irection **F**inding. The amateur technique of locating a transmitter.

Repeater trustee Person elected by an NZART Branch to take responsibility for proper operation of a repeater.

Roger The word that indicates all information was received correctly.

SAR **S**earch **A**nd **R**escue.

Simplex A mode of communications where you transmit and receive on the same frequency.

Sked A pre-arranged radio contact between two or more stations.

SSB **S**ingle **S**ideband. A method of narrow band voice encoding commonly used for long-distance or weak signal communications in both the high Frequency (HF), VHF and UHF parts of the spectrum. Very commonly used in conjunction with amateur satellites.

STSP **R**epeater **S**hort **T**erm **S**pecial **P**urpose **Repeater.** A repeater designed for emergency use or during special events.

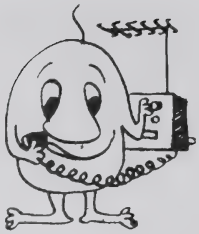
Tone pad A device that is used to generate a standard set of tones that can be used to control certain functions on a repeater, or remote equipment (see DTMF).

Triggering To activate a repeater by transmitting on its input frequency.

Vertical polarization The nominal orientation that a radio wave is taken to have as a result of an aerial's physical layout and orientation. Vertical polarization is by convention very common in repeater operation at VHF/UHF. Antennas on handhelds when held upright and on cars are vertically polarized.

NZART

The New Zealand Association of Radio Transmitters (Inc) is New Zealand's representative society for radio amateurs. It provides a wealth of services to assist both the new and established amateurs. It publishes a monthly magazine (Break-In) and an annual Call Book. It represents the interests of amateur radio at both the national and international levels. It is controlled by an Executive Council elected by members. It has over 80 Branches



throughout New Zealand, and has a membership of over 3000 amateurs.

One of the services that is provided by NZART is the planning of band usage and the national co-ordination of repeaters and beacons. It does this based on the recommendations of its Frequency Management and Technical Advisory Group (FMTAG).

Inquiries about NZART services and membership may be directed to:

NZART Headquarters
PO Box 40-525
Upper Hutt

Establishing a call

There are two accepted way of establishing contact with another station. The first method is to put out a general call to all stations, known as a "CQ", and to hope that another station responds. The second is to call another specific station by prior arrangement, known as keeping a "sked", or after the other station has just finished a contact or called CQ.

CQ calls are not normally made through repeaters. Instead, stations announce that they are "listening" on the repeater. For example, you might say:

"This is ZL2BHF listening seven-ten."

To start a sked with another station, you will call the other station by its call-sign, followed by your own call-sign, such as:

"ZL2QO, this is ZL4HG."

The station that is being called might have his or her call-sign repeated a few times, just in case they don't hear the single call. You might also be wise to issue your own call-sign in phonetics so that there is no mistake who you are. For example:

"ZL2QO, ZL2 Quebec Oscar, ZL2QO, this is ZL4HG, ZL4 Hotel Golf, ZL4HG."

However, remember that phonetics really only need to be used to clarify who you are in conditions that might make certain letters ambiguous, or where the band is noisy, or where your signal is likely to be weak. Over-use of phonetics is rather annoying, and time consuming.

Answering a call

You answer a CQ or sked call from another station in the same way that you would make the sked call in the first place. For example, in the above instance, where ZL4HG is trying to call ZL2QO, the latter station might answer the call in the following way:

"ZL4HG, this is ZL2QO ..."

and the conversation would continue. It's that simple!

How to pass transmission to another station

When you have finished saying what you want to say on one transmission, and you want the other station to reply, you do so by simply saying the word "over".

Before you say the word "over", you may want to indicate the other station's call-sign, and your call-sign too, in that order. Note that it is not absolutely necessary to give both call-signs at the beginning and end of each and every over, your own call-sign will suffice. But, if you do give the call-sign, you must give the full call-sign, not an abbreviated version. For example, use "ZL2BHF" and not "2BHF" or "BHF".

Letting other stations in

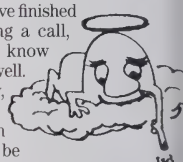
If you are in the middle of a conversation, and a station transmits his call-sign in the pause between transmissions, the next station in the queue to transmit should acknowledge that station and permit him or her to make a call and join the conversation. It is not polite to ignore him and, furthermore, it is rude to acknowledge him but not to let him speak. You never know, the calling station may need to use the repeater immediately. He may have an emergency on his hands, so let him make a transmission promptly.

Joining an existing conversation

If you wish to join a conversation that is already in progress, transmit your call-sign between transmissions. The station that transmits after you drop in your call-sign will acknowledge you, and usually invite you to transmit.

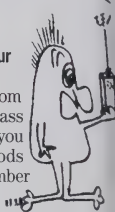
A brief pause, say three seconds, before you begin each transmission allows other stations to participate in the conversation. So don't transmit immediately that the other station stops. If you begin transmitting too quickly, you can prevent other stations from getting in. Also, there might be an emergency, so leave a pause!

Before you join an existing QSO, stop and think, "is it appropriate for me to join in?". If it's a technical matter and you know something about it, it's probably all right. If it's on a more personal level, it might be better to wait until they have finished before giving a call, unless you know them fairly well. Either way, just give your call-sign and wait to be invited in. Jumping straight in with your comments is no better manners on the air that it is in person.



How to tell when it's your turn to talk

The station with whom you are talking will pass transmission back to you by one of the methods outlined above. Remember the pause before you transmit!



When and how often to give call-signs

A major source of frustration and annoyance to many operators can be the excessive use of call-signs. Take this example:

"Zl4 HG from ZL2BHF, are you parked yet Stephen? Over."

"ZL2BHF from ZL4HG. Yes. Over."

"ZL4HG from ZL2BHF, OK I'll see you later. Over."

"ZL2BHF from ZL4HG, over where, over."

We suggest you identify yourself at regular intervals, say once every ten minutes, as well as at the beginning and end of a conversation.

Standards of language, and topics best avoided

Acceptable language should be used at all times. Even what seem like mild expletives can cause offence to some people, and may pave the way for worse behaviour

from others.
Whatever bands, mode or type of operating one is undertaking, there is a fundamental point to remember. That is that the "private" conversation with the other station is actually in public. Never discuss emotive subjects, such as politics, race or religion over the air to avoid the possibility of giving offence to others. Never give any information over the air which might be of assistance to the criminally inclined, such as the time that a house is unoccupied, dates of holidays, and valuables in the house. Telephone numbers, especially those belong to others, should be handled with considerable discretion.

Unidentified transmissions

Occasionally you may hear a conversation that you think you can enhance with a suitably witty addition, suitably anonymous. Don't be tempted to do so! All transmission must be identified! If you hear someone who appears to be a pirate, or who might perhaps be trying to bait the users of the frequency, don't rise to the bait—just ignore them. They will soon become bored and go away.

List of commonly heard Q Codes

Q Codes were originally developed for use with Morse code, to speed up the sending of commonly-used phrases. They are not strictly necessary when carrying on a voice contact, since it is usually just as quick to use the ordinary English equivalent: eg "Go to six-five-two-five" instead of "QSY six-five-two-five". However, some Q Codes are still used quite a bit on VHF and UHF. The more commonly used ones are:

QRM Interference
QRN Static
QRO High power
QRP Low power
QRT Cease transmitting
QRX Stand by
QRZ Who is calling? Who is there?
QSB Fading
QSO Contact, conversation
QSY Change frequency, go to
QTH Location

What a repeater is and how it works

A repeater is a special kind of transmitter and receiver combination that receives a signal and simultaneously retransmits it. A repeater situated on a vantage point such as a hilltop can dramatically increase the range of VHF and UHF communication in hilly areas and for users of low-power transceivers such as handhelds. To prevent the repeater from becoming unusable due to feedback, the receive and transmit frequencies are different. The difference between the two signals is known as the offset or split (see definitions).
To access a repeater, an amateur transmitter has to be set up so that it transmits on the repeater's input frequency and receives on the repeater's output frequency. Most (but not all) repeaters continue to transmit a carrier (known as the "tail") for a few seconds after the input signal ceases, so that the user can check that he or she is actually accessing the repeater. A list of repeater frequencies is given in Section 7 of this Call Book.
In New Zealand all repeaters are "open", that is, any licensed amateur is permitted to use the repeater without necessarily being a member of the local club. This is not necessarily the case in other countries.

Repeater timeouts

Some repeaters incorporate timing devices. These prevent an over from lasting longer than the time that the repeater is set to, usually two or three minutes. If a station transmits for longer than this, the repeater will cease retransmitting after the allotted time is up and a deathly hush will descend upon the frequency. The repeater timer resets when a new transmission begins. Two repeaters that currently incorporate this feature are Motueka 670 and Manawatu 910 (part of the National System).

Repeater alarms

Some of the more sophisticated repeater systems incorporate alarms to warn users of such things as power failure. Usually some kind of tone or signal will appear briefly at the end of each over.
The signal that appears after each transmission on Blenheim 695 is not an alarm but an identifier. It transmits the characters "BM" in Morse.
If you hear an alarm signal, first make a note of what type it is. If it is a digitized voice, what it is saying? Notify the repeater trustee as soon as possible (within reason—phone calls at 3 am are unlikely to be appreciated). If you don't know who the trustee is, get in touch with a committee member of the branch responsible for the repeater.
Most mains-powered repeaters have battery backup systems so that they can keep going if the power fails. As the repeater might have to remain on emergency power for some time, it is best not to use the repeater unless you really need to. Conserve emergency power for emergency use.

DTMF and CTCSS control codes

Some repeaters will respond to DTMF tones (see your transceiver manual to determine if your set can generate these tones). These fall into two main types: codes for use only by trustees for controlling repeater functions, and codes for use by amateurs in general. The most common in the latter group is the signal strength report generator. If a certain sequence of DTMF tones is transmitted, the repeater will respond with an indication of the signal strength it has received. The sequence of tones and the type of response received will vary from repeater to repeater. One thing remains constant with all of them: the need to IDENTIFY YOURSELF. Something along the lines of "This is ZL2BHF testing" is usually sufficient.
The uses of continuous tone coded squelch system (CTCSS) are many and varied. It may be used, for instance, by one station to contact a second without the second station being disturbed by other stations on the frequency. This may be useful when a station is waiting for a specific station to talk, but it is not the way most of us operate. A second use of CTCSS is as a warning that your station is being called, without necessarily locking out other stations. Manufacturers offering CTCSS facilities on their rigs often do so in a way that makes these facilities specific to their products; this may limit the usefulness of this feature. So, you should consult other amateurs before you use these facilities.

The National System

The National System is a series of dedicated linked high-quality repeaters on the 70 cm band. When a station accesses one of these repeaters, the signal is relayed to all other repeaters in the System and can be heard simultaneously up and down the country. For example, a station with a handheld in Wellington can talk via the System to a station in Auckland as if he or she were in the local region.

Guidelines for repeater use

Your local repeater will be monitored by more people than any simplex frequency, both by amateurs and non-amateurs. For many people it will be the only one they use—if it is occupied they will not be able to go to another one in the same way that another simplex channel can be used if one is busy. Therefore, extra courtesy and consideration for others is warranted.
Pay attention to good operating procedures—other listeners need to know what is going on. They will particularly want to know if a contact has been finished, so that they can use the repeater without worrying about getting in the way of someone else's conversation.
Keep in mind at all times why the repeater is there. In most cases, this will be voice communications. Non-voice modes on a voice repeater are not usual practice unless there are special circumstances—which usually means having discussed it previously with the repeater trustee. Digital modes (RTTY, AMTOR, Packet) are especially annoying to listen to and, of course, can't be deciphered without specialized equipment.
Voice on data repeaters (not digipeaters) is considered OK if that repeater is the only one you can use to make contact. It's probably best not to make the QSO any longer than absolutely necessary; you will no doubt reach this conclusion fairly rapidly yourself once the data starts coming in over the top of your transmissions!
One way use (ie, where one or more stations are not heard on the repeater output) is not advisable. A quick call to request another station to go to another frequency is OK, but it is inconsiderate and confusing to others to keep up a one-way contact for any length of time. Use simplex and a dummy load where possible for the alignment and preliminary testing of equipment. Avoid the use of repeater input frequencies for this purpose.
NZART co-ordinates the repeater system and will generally only accept proposals for repeaters that meet the guidelines commonly accepted in New Zealand. The FMTAG is responsible to NZART for the maintenance of repeater technical standards and recommended channel allocations. All repeater systems in New Zealand require a licence from the New Zealand Radio Frequency Service.
Bear in mind that all the comments above apply specifically to New Zealand repeaters and there may be marked differences in the operation of overseas repeaters

and the procedures which you must use to work with them.
Amateur radio is "on display" on repeaters more than anywhere else. Try to create as good an impression as possible.

Phone patches

Radio regulations and licence requirements should be carefully observed when using a phone patch. Non-amateurs are not permitted to control an amateur station.
Normal traffic handled is "brief personal" messages, not business or commercial, and ONLY within New Zealand.
Phone patch equipment requires proper authorization to permit its connection to the public switched telephone network.

Packet radio

Messages sent via Packet radio should be in the spirit and tradition of amateur radio and meet the requirements of the Radio Regulations.
Care should be taken when distributing hardware, software or publications via Packet radio as it may be interpreted by others as advertising or infringing the copyright of material originated by others.

Priorities on repeaters

Repeaters allow mobile and portable stations away from the luxuries of mains power supplies and sophisticated antenna systems to increase their range. Another important purpose is to facilitate emergency communications.
Amateur Radio Emergency Corps (AREC) operators are distinguished by the use of E (emergency) call-signs, for instance ZL2EMA. If you hear these stations, give them priority.
Portable stations are those who are operating away from home, for example, a holidaymaker at a motor camp or a tramper in the ranges. They will identify themselves by using the word "portable" after the call-sign, eg: "This is ZL2QO portable listening seven-one-seven-five." If you hear these stations, give them priority—they may not have access to a telephone and could be needing to relay an urgent message.Mobile stations are actually on the move at the time of transmission. They may quite often be heard on their way to and from work at peak hours, and will identify themselves by saying: "This is ZL4HG mobile seven-ten." There are all sorts of variations on this basic theme, such as "pedestrian mobile" (on foot), "train mobile", "maritime mobile" (all at sea?) and even "stationary mobile"—surely a contradiction in terms if ever there was one! Mobile stations may need to report breakdowns, traffic delays, traffic accidents or other urgent/important pieces of information, so should be given priority if heard.
Usually a mobile or portable station will not hog the repeater but will be listening for other stations who may need to use the frequency. With a little give and take there is plenty of room for all.

STSP Repeater

(Short Term Special Purpose repeater). A repeater designed for emergency use or during special events. An example is perhaps the need to provide communication for some local public event. It's important to note that the frequencies that protected so that the repeaters can be moved about with little chance of interference with other repeaters.

The three second rule

Three seconds should be left between each over to allow other stations to access the repeater. If another station calls, let them in straight away—they may have an urgent message to transmit.

Long QSOs on repeaters

Lengthy conversations on repeaters need to be approached with care. It would not be very thoughtful to tie up a repeater for a long time during rush hour or early evening when other people are likely to be wanting to use it. Late at night is best. Where available, a 70 cm repeater that's not part of the National System might be a better choice if there is less traffic on that band and less likelihood of getting in someone else's way. Make sure that you leave three second gaps for other traffic, and it may also be a good idea to leave longer gaps, such as 10 seconds, every so often. Bear in mind, too, that even though you may make every effort to allow other stations to use the repeater if they need to, many people would rather wait until you have finished altogether. If possible, break the conversation up into two or three shorter contacts and leave the repeater free in between them.
More of a nuisance than long QSOs are long overs, especially when there are inadequate gaps between them. At busy times, keep the overs short so as to allow others, possibly with urgent messages, to access the repeater

Checking the repeater input signal

Most radios these days have a setting called "repeater reverse", "monitor" or something similar which allows the operator to check the repeater input signal, ie, the frequency the other station is actually transmitting on. If you can hear this signal, it is a good indication that simplex contact with the station is possible.

Using simplex

Home station to home station contacts should be made on simplex where possible, thus leaving the repeaters free to facilitate mobile and portable communication.
Simplex is like carrying on a conversation at the back of a room: although fewer people will hear it, it is still not private. The same standards of language and content apply regardless of frequency.
There are eight designated FM simplex channels on both the 2 m and 70 cm bands. A list of simplex channels is given in this Call Book.

Channel terminology

Channels or frequencies that are used on VHF/UHF are not normally named by all the numbers that make up the frequency. Instead, it is more common to use an abbreviated form of frequency for convenience. For example, the common simplex frequency of 146.525 MHz is referred to as six-five-two-five, where the rule is to omit the first two digits and the decimal point. The exception to this rule is where the frequency ends in zero, in which case the zero is omitted. For example, the frequency 147.000 MHz is referred to as seven-hundred, not seven-thousand.

Simplex and repeater signal reports

Many transceivers incorporate a signal strength meter (often called an S-meter). When you are listening to a transmission on simplex, the S-meter reading will give you an indication of how strong the station's signal is. With a repeater, the situation is quite different. The repeater signal strength remains constant, regardless of the transmitting station's signal strength. The degree of signal quieting varies instead—a strong input signal produces a clear, noise-free repeater output—described as "fully quieting" or "fully limiting"—while a weak signal will be noisy. If a signal falls below a certain level, it will not hold the repeater reliably but will pulse it intermittently or drop out altogether.
Please remember that other stations rely on signal reports to determine how well their setup is working—try to make your signal reports as accurate as you can.

Other modes

FM is not the only mode used on VHF and UHF, in fact almost any mode can, and often is, used on these bands. For example, singleband (SSB) is used for weak signal and long-distance work towards the bottom end of the 2 m band. By contrast, CW or Morse is used for very exotic work such as earth-moon-earth (E-M-E) communication. As on all bands, you choose the mode that best suits your application and your desire for experimentation. You should be aware that many of the conventions we have outlined above for repeater operation may not necessarily apply to some of these exotic modes. As an extreme case, in E-M-E operation contacts are highly structured, based on very severe time constraints. The precise procedures for all the modes are beyond the scope of this article. They are covered in the recommended references.

The 6 m band

The 6 m band (50–54 MHz), lying between the highest high-frequency band and the 2 m VHF band, provides some exciting scope for experimentation into unusual modes of radio propagation. Communications over several thousands of kilometres is possible under favourable conditions, while at other times the band can seem dead.
This bands lies close to the television Channel One, even overlaying part of this channel. For this reason a special MoC permit is required for operation in part of this band. You should consult a local Branch of NZART, FMTAG or known 6 m enthusiasts for details on the specific procedures before you begin operation.

Summary

Most of the special points relating to repeater use come under the category of commonsense considerations for others.
The Amateur's Code, first published in the ARRL Handbook, and reprinted in this Call Book, sums these up succinctly and we can do well to bear it in mind at all times.

LEARNING THE MORSE CODE

On 17 June 2004, the Morse test was abolished as a requirement for the New Zealand Amateur license. It had been there from the very beginning, since the first Radio Regulations were Gazetted in 1923. Over the years, the speed required fluctuated, increasing to a high of 15 wpm for a "High frequency permit" in 1945, then dropping to 12, then finally to 5 wpm in December 2001. Its passing into history was viewed with regret and sadness by some, and with relief by others. But Morse will never die, and there will always be many who use it for contests and difficult DX contacts, and who prefer it to all other modes for its simplicity and beauty.

For those reasons, and because it played an overwhelmingly important part in our history, I recommend that you at least try it.

But despite what old timers may say, very few of us found learning to copy Morse code easy. Historical research shows that learning to copy 12 wpm requires an average of about 70 hours of study, but there are wide variations. On average, about 10 per cent of learners manage it in 10 hours or less, and another 10 per cent take more than 150 hours. A very few never achieve it no matter how long they persevere, and I am convinced that this is because they genuinely cannot not "make sense of the sounds" at all.

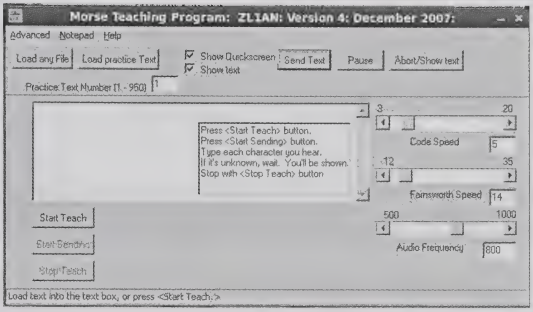
This should not surprise us. Some people are tone deaf, some cannot learn foreign languages, and some never get the hang of algebra. "Morse ability" seems to be little correlated with intelligence, musical ability, sex, age, or high achievement in other areas.

What is the "right way" to learn? All authorities agree that the very worst thing you can do is to memorize the code symbols from a printed chart. If you have one, never look at it again! Morse is an aural language, and must be learned by listening. This may surprise you, but the evidence is extensive and irrefutable.

I'm personally convinced that the very best way to learn is from a well-written computer program. Computers are patient, non-judgmental, and very good at keeping statistics.

A free program, written specifically for ZL learners, is available for downloading from the NZART website[1].

You'll need a PC running Windows 95 through Windows 7. The methods used are based on scientific research, with



algorithms honed by feedback from users over 20 years. I know that it teaches Morse better than I can, and has got many people through Morse tests in several countries. If you have access to a computer, get it, and try it. Here are the download instructions:

- Go to the NZART website[1].
- Click the link to "Exam information".
- Near the bottom of the page, in the text at item number 5, you'll see in the section"Learning the Morse Code", a green box saying "Teaching Software Filename:"
- Click on the blue words "-install-teach4.exe". You should be asked if you wish to save the installation file. Click "yes". It will come.
- Run the file. The program will install and start.

If you don't have a computer, your local NZART Branch may. In fact, these days older, used computers are so cheap that EVERY branch should have one for Morse practice, and for members to check out other Ham software.

There are other programs available, but some can't be recommended. If you have one that

- shows you visual symbols of the code
- teaches "opposites" (like "r" and "k") or "series" (like "eish5")
- gives only "random group" practice
- does not give you an ordered structure for learning
- teaches you to pass the US, UK or Canadian tests (which have a different format)
- sends characters at a speed less than 12 wpm

delete it immediately.

A picture of the recommended program's operating window is shown in the figure. Everything is done by pushing buttons, as described in the comprehensive "help" file supplied. This tells you exactly how to start, continue, and work up to a reasonable operating speed.

"Farnsworth" Morse is used throughout, and should always be used for learning. This mode is named in honour of Russ Farnsworth, an early teacher who popularised the method, though he was not the first to use it. Characters are sent at a faster rate than for "correct" morse, with longer gaps between, to reinforce the learning of characters as "complete sound sequences", and not as an individually- perceived dits and dahs. Failure to teach this way is now recognised as the reason for the infamous "plateaus" that learners reached around 10–14 wpm, which old-timers mutter darkly about. Using Farnsworth Morse, this plateau is eliminated. The next one most people strike isn't usually reached until around 40–50 wpm!

However you proceed, you should learn the numbers at the same time as the letters. If you leave them "until later", they'll be harder because you won't have practiced them as much.

The program recommended above implements all of these features. The initial character teaching process is aural, and adaptive, with characters introduced at a rate governed by your own response from the keyboard, reinforced by a histogram display showing your progress. Several sessions will be necessary for this, but the program will give you a progress report at the end of each one, and you'll probably be surprised to see your ability continually improving.

Having learned the characters, 900 plain-language texts, similar to the old test texts, are provided for practice. Now you can start to write down the text. I recommend starting at an overall speed of 3 wpm, with Farnsworth speed 14 wpm, which gives you about two seconds "thinking time" between characters. Increase the overall speed as you gain proficiency, and when this reaches 14 wpm, you'll be hearing "correctly-spaced" Morse. As well as these texts, 50 "sample QSOs" are provided to help you get used to what you'll hear on the HF bands.

Start sending practice only after you have the correct sound and rhythm of the characters firmly imprinted in your mind. Most of the candidates I examined in the last years of the Morse test had great difficulty attaining acceptable sending, because they started with the wrong grip, and sent with finger instead of wrist movement. A recommended procedure is given in the "Help" file of the teaching program above.

However, it's also helpful to see the correct way in use. An excellent You-Tube video by a Japanese operator[2] shows you one method of learning, and what good code sounds like. He uses the "European" type key having a heavy, straight bar in common use in ZL. The "American" key, with slimmer, bent bar requires a different action. Many other videos show on the same page, some much better than others.

Many have found it helpful to just listen to audio Morse while driving or doing the dishes. A virtually unlimited supply of this can be created with the free computer program "ebook2CW"[3]. This creates MP3 files from public-domain "ebooks" accessed by links on the same website. These include the complete works of Shakespeare!

Several excellent free Morse reading computer programs can also be downloaded from the web[4]. All these require reasonable code, good signal strength, and little fading and interference to decode well, but many have found that watching the words form on the screen while listening to them aids the learning process.

It's still possible to learn as we all did in the old days, by listening to Morse practice sessions on the local repeater, or on the bottom end of 80 m if you have an HF receiver. Listen around between 3.550 and 3.650 MHz between 7 and 8 pm for a week, and you'll probably hear some. They're easy to recognise because slow Morse is sent for a few minutes, followed by a "read-back" by the control station, and questions and comments by listeners.

How long, and how frequently, should you practice? Half an hour per day is fine. Some people find that before breakfast, when the mind is fresh, is better than in the evening. Others find that two or even three 20 minute sessions per day work best. In any case, stop when your mind begins to wander, or if you feel you're getting overwhelmed.

When you can cope with 10–12 wpm, try to have at least a few contacts on the air. Your reading doesn't have to be perfect! Most of us miss some characters or words because of conditions, or because the other operator goofs. You may find that CW becomes quite fascinating. You'll begin to recognise the different morse rhythms sent by straight keys, bugs, keyers and the keyboards of the high-speed merchants, and learn to recognise the distinctive "fists" of regular operators–which become as distinctive as voices. You'll find that DX contacts with foreign stations are easy. Everybody has enough basic English for a CW contact, and many foreign stations operate almost exclusively on CW.

You'll also begin to find that you can read Morse faster than you can send it on a straight key. This is the time to invest in an electronic keyer and paddle. It is easy and cheap to construct a keyer yourself, using one of the many microprocessor-controlled chips available on the web. Paddles are not cheap, but again, you can make one yourself.

References:

1 The NZART website is http://www.nzart.org.nz/index.html
2 View the video at http://www.youtube.com/watch?v=ncOcgarGJHI&feature=related
3 Download "ebook2cw" from http://fkurz.net/ham/ebook2cw.html
4 For code reading programs, see http://www.dxsoft.com/

THE FIRST CW QSO

GARY BOLD
ZL1AN

If you learned Morse from "plain language" English texts without doing much, or any, listening on the air, listening to real Ham CW conversations is initially a perplexing experience. It takes some time to get used to the conventions, the Q codes, the abbreviations, the background noise, and the interference. After a while, however, you'll realise that the first few overs are usually very stylised, especially between stations who have not made contact before. The "standard information" (name, QTH, signal report, maybe power, rig, antenna) is always exchanged in a similar manner, and critical bits are always repeated. Only after a couple of overs does the conversation become less formal, but even then most of us follow patterns.

How should you go about it? Here are some suggestions

For your first QSO, it's a good idea to arrange a contact with some experienced local who will send good, slow Morse, with a strong enough signal to overcome the noise — which can be quite unsettling if you have listened only to noise-free code sent in practice sessions. During the contact, practise by sending the standard information just as you would to an unknown operator.

Here is how the conversation might go. I have included the abbreviations you'll hear frequently, and which you'll need to become familiar with.

ZL1XYZ ZL1XYZ DE ZLIAN ZLIAN K ZLIAN DE ZL1XYZ—GE OM ES TNX FER CALL — RST 589 589 — NAME HR FRED FRED ES QTH HAMILTON HAMILTON HW K?

ZL1AN DE ZL1XYZ K ZL1XYZ DE ZLIAN — GE FRED — RST 579 579 — NAME HR GARY GARY ES QTH AUCKLAND AUCKLAND HW K?

ZL1XYZ DE ZLIAN K ZLIAN DE ZL1XYZ — R FB GARY — WX HR TODAY FINE ES TEMP 23—RG HR TS440 RUNNING 100W — ANT IS DIPOLE AT 10 METRES — HW K?

ZL1AN DE ZL1XYZ K ZL1XYZ DE ZL1AN R FB FRED — HR WX COLD BUT NO RAIN — RIG HR YAESU FT767GX — PWR 50W ES ANT END FED RANDOM WIRE WITH TUNER HI —BAND GUD TONITE — NO QRN OR QRM — HW K?

ZL1XYZ DE ZLIAN K ZL1AN DE ZL1XYZ R FB GARY — TNX FER QSO — NW CUL ES 73 GARY GN OM — ZL1AN DE ZL1XYZ SK dit dit dit dit
dit dit

Now at 12 wpm that exchange will have taken just over 10 minutes. That's plenty long enough for a start, so you can sign off gracefully. I guarantee you'll get a real buzz out of achieving that!

Points to note

- Overs start and finish with the call-sign exchange, terminate with "K". Some operators insert "AR" before the last one, and finish with "KN" — which means "I don't want anybody to break in". But most of us enjoy having others enter our conversations.
- We used the most common standard abbreviations: GE, ON, ES, TNX, R FER, HR, HW, FB, WX, RIG, ANT, HI, W, GUD, NW, CUL, GN. "HI" is usually sent as "HEE". (dididit dit dit) If these are new to you, look them up in this Call Book. They'll rapidly become intuitive, and really save time.
- We used the most common Q-code and procedural signs QTH, QRM, QRN, QSO, RST.
- We exchanged information in a very stylised manner. Between friends or ragchewers conversations will be less formal, especially after the first few overs, but you won't go wrong proceeding in just this way, and many DX conversations sound just like this.
- We each ended with a pleasant "dit dit" to say goodbye — not necessary, but you'll often hear it. (Sometimes after an interesting conversation several other "dit dits" will sound, from phantom listeners who have been following the conversation.)

Almost everybody initially finds it difficult to "send from the head" instead of reading from a text as you will probably have been doing in practice. Therefore, write down the first few overs you'll send-at least in skeleton form, so you can send from the hard copy. You'll rapidly find that this also becomes unnecessary. You'll also probably find it more natural to initially write down everything received, as you will have been doing while learning. With experience you'll begin to "read in the head" and note down only call-signs, times, signal reports, names and items to comment on. Experienced operators write up the log as they go, but at first it's much easier to scribble details down on a scratch pad and complete the log carefully afterwards.

If the conversation continues longer, what do you say? CW operators talk about almost everything. Make two more lists: one of short phrases about your job, your age, your family, your other hobbies, other modes you operate. You should ask questions also: what is your job? Do you operate PSK31/MFSK16/ATV? How long have you been a ham? This may seem contrived, but it will get you going. After a while these memory joggers won't be necessary either.

On the DX bands you will often hear stations calling "CQ". Eventually you'll want to send one yourself. The "3 × 3" format is best, that is: CQ CQ CQ DE ZL1AN ZLIAN ZLIAN repeated three times, terminated with "K". Don't be one of those irritating people who send "CQ CQ ..." 25 times before giving a call-sign. Listeners get impatient and wander off. Short calls, repeated after a few seconds are best. If you call CQ, tune around a few kHz listening for answers, as somebody may have forgetfully left his RIT engaged, and be replying outside your passband.

When 40m and above are open, DX contacts are easy, since ZL stations are held to be quite rare and everybody is happy to talk to us. Such contacts are often quite short. Often you'll hear: "MY QSL SURE PS QSL VIA BURO" which means "I will certainly send you my QSL card, please send yours via the QSL bureau". Information regarding QSL Bureau procedure will be found elsewhere in the Call Book, and somebody at the local Branch will explain what to do.

If you answer a CQ the accepted polite thing to do is to send back at a speed no greater than that of the sending station–unless you know that the other operator is capable of higher speeds. If somebody answers you at speeds higher than you can comfortably receive, send back "PSE QRS 12 WPM"–or whatever speed you can copy. If the other station won't do this, just sign off gracefully and talk to somebody else. There are plenty of DX stations who send around this speed, and many, CQing faster, will gladly slow down to talk to you.

You will also hear conversations at higher speeds in the 20 – 35 wpm range. These operators generally use electronic keyers and send very good Morse. Listen to such contacts frequently and you'll find your reading speed slowly improves. Once you have the experience to read in this range, you'll find contacts very enjoyable as a surprising amount of information can be passed at these speeds, and the Morse is better. You can easily build an electronic keyer yourself. Microprocessor-controlled chips are cheap, widely available from the web, and require few additional components. Google on "youtube homebrew keyer paddle" and you'll see some interesting paddle suggestions.

Many have found that watching Morse decode on a computer screen while listening is very helpful for improving their reading ability. The simplest Windows program to get going is "CWget", written by Sergei, UA9OSV[1]. Another is "CWdecoder", written by Grant, WD6CNF[2]. Experienced operators say that the best is "MRP40", written by Norbert Pieper[3].

These require only a cable connecting the audio from the receiver to the soundcard input, and are straightforward to set up.

You'll hear stations conversing at 30–60 wpm sending with Morse keyboards, although the operators will almost certainly be reading in their heads. Once you can copy at these speeds, the Morse, being perfect, is a delight to copy–it just "decodes itself". Conversations at these speeds are typically much more in "plain language" with few abbreviations and included punctuation.

Sergei provides a companion morse keyboard sending program, "CWtype", while Grant's reading program has a keyboard included. Both were designed to interface with the transmitter keying circuit via a simple interface connected to a printer or com port. But most modern computers have only USB ports, which are far more complicated to drive. Sergei recommends using one of several different commercial interfaces–see his website–which usually allow operation on several other modes as well. But this is an added expense, and Dennis, KF3AD published an alternative interface in QST January 2007 which generates logical Morse from the soundcard audio. You can download his article from the web[4].

Come down and join the regulars on the bottom end of 80 metres! We'll be glad to talk to you!

References

[1] Download "Cwget" from http://www.dxsoft.com/en/downloads/

[2] Download "CWdecoder" from http://www.amqrp.org/projects/cwdecod/cwdecod.htm

[3] Download "MRP-40" from http://www.polar-electric.com/Morse/MRP40-EN/index.htm

[4] See the sound-card to logic article at http://www.polar-electric.com/Morse/TX_via_Soundcard.pdf

ABBREVIATIONS FOR CW WORK

ABT	About
AGN	Again
ANT	Antenna
AR K	End of transmission
AR VA	Final end of transmission
AS	Wait
BCI	Broadcast interference
BCL	Broadcast listener
BK	Break; I wish to break-in (interrupt) a transmission in progress
BN	All between; been
BUG	Semi-automatic key
B4	Before
C	Yes
CL	I am closing my station; call
CPI, CPY	Copy
CQ	Calling any station
CUAGN	See you again
CUD	Could
CUL	See you later
CW	Continuous wave, i.e. radio telegraphy
DE	From
DR	Dear
DX	Distance, foreign countries
ER	Here
ES	And; &
FB	Fine business, excellent
FER	For
FM	Frequency modulation; From
GA	Go ahead, continue sending; good afternoon
GB	Goodbye
GE	Good evening
GG	Going; grounded grid
GM	Good morning
GN	Good night
GND	Ground
GUD	Good
HI	Laughter; High
HPE	Hope
HR	Here; Hear; Hour
HV: HVE	Have
HW	How
K	Go ahead
KN	specific station go ahead
MA; MILS	Milliamperes
MNI	Many
MSG	Message
N	No; North
NCS	Net control station
ND	Nothing doing
NIL	Nothing; I have nothing for you
NR	Number
NW	Now
OB	Old boy
OC	Old chap
OM	Old man
OP; OPR	Operator
OT	Old timer; Old top
PSE;	Please
PWR	Power
R	Received as transmitted; are (sometimes also used as a decimal point, e.g. 1R5)
RCVR; RX	Receiver
REF	Refer to; Referring to; Reference
RFI	Radio frequency interference
RIG	Station equipment
RPRT, REPT	Report
RPT	Repeat; I repeat
RTT; RTTY	Radioteletype
RX; RCVR	Receiver
SA	Say
SASE	Self-addressed, stamped envelope
SED	Said
SIG	Signal
SKED	Schedule
SRI	Sorry
SSB	Single sideband
SUM	Some
T	Zero (0)
THO	Though
THRU; THRO	Through
TMW	Tomorrow
TNX; TKS	Thanks
TT	That
TU; TKU	Thank you
TVI	Television interference
TX	Transmitter
TXT	Text
U	You
UR	Your; You are (sometimes YR)
URS	Yours (sometimes YRS)
VFO	Variable frequency oscillator
VY	Very
WID	With
WKD; WKG	Worked; Working
WL	Well; Will
WUD	Would
WX	Weather
XCVR	Transceiver
XMTR; TX	Transmitter
XTAL	Crystal
XYL; YF	Wife
YL	Young lady
73	Best Regards
88	Love and kisses

THE Q-CODE

QRG Will you tell me my exact frequency (or that of . . .)?
Your exact frequency (or that of . . .) is . . .kHz.

QRH Does my frequency vary?
Your frequency varies.

QRI How is the tone of my transmission?
The tone of your transmission is . . .
(1. Good; 2. Variable; 3. Bad)

QRK What is the intelligibility of my signals (or those of . . .)?
The intelligibility of your signals (or those of . . .) is . . .
(1. Bad; 2. Poor; 3. Fair; 4. Good; 5. Excellent)

QRL Are you busy?
I am busy (or I am busy with . . .) Please do not interfere.

QRM Is my transmission being interfered with?
Your transmission is being interfered with . . .
(1. Nil; 2. Slightly; 3. Moderately; 4. Severely; 5. Extremely)

QRN Are you troubled by static?
I am troubed by static . . .
(1–5 as under QRM)

QRO Shall I increase power?
Increase power.

QRP Shall I decrease power?
Decrease power.

QRQ Shall I send faster?
Send faster (. . . wpm).

QRS Shall I send more slowly?
Send more slowly (. . .wpm)

QRT Shall I stop sending?
Stop sending.

QRU Have you anything for me?
I have nothing for you.

QRV Are you ready?
I am ready.

QRW Shall I inform . . . that you are calling him on . . .kHz?
Please inform . . . that I am calling on . . .kHz.

QRX When will you call me again?
I will call you again at . . . hours (on . . .kHz).

QRZ Who is calling me?
You are being called by . . . (on . . .kHz)

QSA What is the strength of my signals (or those of . . .)?
The strength of your signals (or those of . . .) is . . .
(1. Scarcely perceptible; 2. Weak; 3. Fairly good; 4. Good; 5. Very good)

QSB Are my signals fading?
Your signals are fading.

QSD Are my signals mutilated?
Your signals are mutilated.

QSK Can you hear me between your signals and if so can I break in on your transmission?
I can hear you between my signals; break in on my transmission.

QSL Can you acknowledge receipt?
I am acknowledging receipt.

QSM Shall I repeat the last message I sent you, or some previous message?
Repeat the last message which you sent me [or message(s) number(s) . . .]

QSN Did you hear me (or . . .) on . . .kHz?
I did hear you (or . . .) on . . .kHz.

QSO Can you communicate with . . . direct or by relay?
I can communicate with . . . direct (or by relay through . . .)

QSP Will you relay to . . .?
I will relay to . . .

QST General call preceding a message addressed to all amateurs and ARRL members.

QSU Shall I send or reply on this frequency (or . . .kHz)?
Send or reply on this frequency (or . . .kHz).

QSV Shall I send a series of Vs on this frequency (or on . . .kHz)?
Send a series of Vs on this frequency (or on . . .kHz)

QSW Will you send on this frequency (or on . . .kHz)?
I am going to send on this frequency (or on . . .kHz)

QSX Will you listen to . . . on . . .kHz?
I am listing to . . . on . . .kHz.

QSY Shall I change to transmission on another frequency?
Change to transmission on another frequency (or on . . .kHz).

QSZ Shall I send each word or group more than once?
Send each word or group twice (or . . . times).

QTC How many messages have you to send?
I have . . . messages for you (or for . . .)

QTH What is your location?
My location is . . .
(QTHR—Location as per Call Book)

QTR What is the correct time?
The time is . . .

Morse Alphabet

A	• —	N	— •
B	— • • •	O	— — —
C	— • — •	P	• — — •
D	— • •	Q	— — • —
E	•	R	• — •
F	• • — •	S	• • •
G	— — •	T	—
H	• • • •	U	• • —
I	• •	V	• • • —
J	• — — —	W	• — —
K	— • —	X	— • • —
L	• — • •	Y	— • — —
M	— —	Z	— — • •

Numerals

1	• — — — —	6	— • • • •
2	• • — — —	7	— — • • •
3	• • • — —	8	— — — • •
4	• • • • —	9	— — — — •
5	• • • • •	0	— — — — —

Procedure Signals

Full stop	(.) • — • — • —
Comma	(,) — — • • — —
Colon	(:) — — — • • •
Question mark/Repeat	(?) • • — — • •
Apostrophe	(') • — — — — •
Hyphen/dash	(-) — • • • • —
Fraction bar	(/) — • • — •
Parenthesis (left hand)	(() — • — — •
Parenthesis (right hand)	()) — • — — • —
Quotation marks	(“) • — • • — •
Error	• • • • • • • •

Spacing and length of signal

1. A dash is equal to three dots.
2. The space between the signals which form the same letter is equal to one dot.
3. The space between two letters is equal to three dots.
4. The space between two words is equal to seven dots.

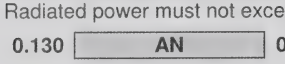
WORLD TIME CONVERSION CHART IN HOURS

Greenwich Meridian Time, London, England	Central Europe, Berlin, Geneva, Stockholm, Vienna	Athens, Cape Town, Cairo	Arabia, Iraq, Eastern Europe, Moscow, Ethiopia, Malagasy	Mauritius, Oman, Reunion Island	Central Russia, Pakistan	Calcutta, Novosibirsk Russia, Bangladesh	Laos, Sumatra, Thailand	Philippine Islands Perth Australia	Central Australia, Tokyo Japan	Eastern Australia, Melbourne, Sydney	New Caledonia	**International Date Line,** Fiji Islands, New Zealand Standard Time	Nome, Alaska, Samoa, Midway Islands	Hawaiian Islands	Eastern Alaska, Dawson	Pacific Standard Time, Los Angeles, Seattle, Juneau	Mountain Standard Time, Calgary, Denver, Phoenix	Central Standard Time, Chicago, Costa Rica	Eastern Standard Time, Montreal, New York, Peru	Atlantic Standard Time, Chile, Nova Scotia	Greenland, Rio de Janiero, Brazil	Fernando de Horonha	Azores, Cape Verde
0000	1am	2am	3am	4am	5am	6am	7am	8am	9am	10am	11am	Noon	**1pm**	**2pm**	**3pm**	**4pm**	**5pm**	**6pm**	**7pm**	**8pm**	**9pm**	**10pm**	**11pm**
0100	2am	3am	4am	5am	6am	7am	8am	9am	10am	11am	Noon	**1pm**	**2pm**	**3pm**	**4pm**	**5pm**	**6pm**	**7pm**	**8pm**	**9pm**	**10pm**	**11pm**	Mid Night
0200	3am	4am	5am	6am	7am	8am	9am	10am	11am	Noon	**1pm**	**2pm**	**3pm**	**4pm**	**5pm**	**6pm**	**7pm**	**8pm**	**9pm**	**10pm**	**11pm**	Mid Night	1am
0300	4am	5am	6am	7am	8am	9am	10am	11am	Noon	**1pm**	**2pm**	**3pm**	**4pm**	**5pm**	**6pm**	**7pm**	**8pm**	**9pm**	**10pm**	**11pm**	Mid Night	1am	2am
0400	5am	6am	7am	8am	9am	10am	11am	Noon	**1pm**	**2pm**	**3pm**	**4pm**	**5pm**	**6pm**	**7pm**	**8pm**	**9pm**	**10pm**	**11pm**	Mid Night	1am	2am	3am
0500	6am	7am	8am	9am	10am	11am	Noon	**1pm**	**2pm**	**3pm**	**4pm**	**5pm**	**6pm**	**7pm**	**8pm**	**9pm**	**10pm**	**11pm**	Mid Night	1am	2am	3am	4am
0600	7am	8am	9am	10am	11am	Noon	**1pm**	**2pm**	**3pm**	**4pm**	**5pm**	**6pm**	**7pm**	**8pm**	**9pm**	**10pm**	**11pm**	Mid Night	1am	2am	3am	4am	5am
0700	8am	9am	10am	11am	Noon	**1pm**	**2pm**	**3pm**	**4pm**	**5pm**	**6pm**	**7pm**	**8pm**	**9pm**	**10pm**	**11pm**	Mid Night	1am	2am	3am	4am	5am	6am
0800	9am	10am	11am	Noon	**1pm**	**2pm**	**3pm**	**4pm**	**5pm**	**6pm**	**7pm**	**8pm**	**9pm**	**10pm**	**11pm**	Mid Night	1am	2am	3am	4am	5am	6am	7am
0900	10am	11am	Noon	**1pm**	**2pm**	**3pm**	**4pm**	**5pm**	**6pm**	**7pm**	**8pm**	**9pm**	**10pm**	**11pm**	Mid Night	1am	2am	3am	4am	5am	6am	7am	8am
1000	11am	Noon	**1pm**	**2pm**	**3pm**	**4pm**	**5pm**	**6pm**	**7pm**	**8pm**	**9pm**	**10pm**	**11pm**	Mid Night	1am	2am	3am	4am	5am	6am	7am	8am	9am
1100	Noon	**1pm**	**2pm**	**3pm**	**4pm**	**5pm**	**6pm**	**7pm**	**8pm**	**9pm**	**10pm**	**11pm**	Mid Night	1am	2am	3am	4am	5am	6am	7am	8am	9am	10am
1200	**1pm**	**2pm**	**3pm**	**4pm**	**5pm**	**6pm**	**7pm**	**8pm**	**9pm**	**10pm**	**11pm**	Mid Night	1am	2am	3am	4am	5am	6am	7am	8am	9am	10am	11am
1300	**2pm**	**3pm**	**4pm**	**5pm**	**6pm**	**7pm**	**8pm**	**9pm**	**10pm**	**11pm**	Mid Night	1am	2am	3am	4am	5am	6am	7am	8am	9am	10am	11am	Noon
1400	**3pm**	**4pm**	**5pm**	**6pm**	**7pm**	**8pm**	**9pm**	**10pm**	**11pm**	Mid Night	1am	2am	3am	4am	5am	6am	7am	8am	9am	10am	11am	Noon	**1pm**
1500	**4pm**	**5pm**	**6pm**	**7pm**	**8pm**	**9pm**	**10pm**	**11pm**	Mid Night	1am	2am	3am	4am	5am	6am	7am	8am	9am	10am	11am	Noon	**1pm**	**2pm**
1600	**5pm**	**6pm**	**7pm**	**8pm**	**9pm**	**10pm**	**11pm**	Mid Night	1am	2am	3am	4am	5am	6am	7am	8am	9am	10am	11am	Noon	**1pm**	**2pm**	**3pm**
1700	**6pm**	**7pm**	**8pm**	**9pm**	**10pm**	**11pm**	Mid Night	1am	2am	3am	4am	5am	6am	7am	8am	9am	10am	11am	Noon	**1pm**	**2pm**	**3pm**	**4pm**
1800	**7pm**	**8pm**	**9pm**	**10pm**	**11pm**	Mid Night	1am	2am	3am	4am	5am	6am	7am	8am	9am	10am	11am	Noon	**1pm**	**2pm**	**3pm**	**4pm**	**5pm**
1900	**8pm**	**9pm**	**10pm**	**11pm**	Mid Night	1am	2am	3am	4am	5am	6am	7am	8am	9am	10am	11am	Noon	**1pm**	**2pm**	**3pm**	**4pm**	**5pm**	**6pm**
2000	**9pm**	**10pm**	**11pm**	Mid Night	1am	2am	3am	4am	5am	6am	7am	8am	9am	10am	11am	Noon	**1pm**	**2pm**	**3pm**	**4pm**	**5pm**	**6pm**	**7pm**
2100	**10pm**	**11pm**	Mid Night	1am	2am	3am	4am	5am	6am	7am	8am	9am	10am	11am	Noon	**1pm**	**2pm**	**3pm**	**4pm**	**5pm**	**6pm**	**7pm**	**8pm**
2200	**11pm**	Mid Night	1am	2am	3am	4am	5am	6am	7am	8am	9am	10am	11am	Noon	**1pm**	**2pm**	**3pm**	**4pm**	**5pm**	**6pm**	**7pm**	**8pm**	**9pm**
2300	Mid Night	1am	2am	3am	4am	5am	6am	7am	8am	9am	10am	11am	Noon	**1pm**	**2pm**	**3pm**	**4pm**	**5pm**	**6pm**	**7pm**	**8pm**	**9pm**	**10pm**

NEW ZEALAND AMATEUR RADIO BANDPLANS P1 OF 2

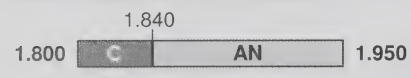
These charts show the New Zealand bandplans. **These bandplans are to ensure that your transmissions do not impose problems on other operators and that their transmissions do not impact on you. It is to the advantage of all operators that the published bandplans be used.** The Ministry of Economic Development (MED) defines the band limits, while the internal band segments are derived from the IARU Region 3 bandplans with New Zealand adaptations. The band limits are found in Radiocommunications Regulations (General User Radio Licence for Amateur Radio Operators) on the NZART web site in the Study Guide (Regulations) http://www.nzart.org.nz/exam/index.html and at each end of the band blocks as shown below.
The IARU Region 3 bandplans, developed to meet international requirements, are at the IARU Region 3 web site. http://www.iaru-r3.net/r3bandplan.doc

0.130 to 0.190 MHz – 1800 metres
Radiated power must not exceed 5 W e.i.r.p.

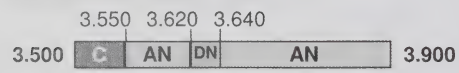


0.505 to 0.515 MHz – 600 metres
http://www.nzart.org.nz/policies/2010-access-to-600m.html
Temporary allocation from 1-March-2010.
Radiated power must not exceed 25 W e.i.r.p.

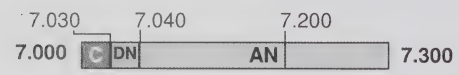
1.800 to 1.950 MHz – 160 metres



3.500 to 3.900 MHz – 80 metres



7.000 to 7.300 MHz – 40 metres
Amateur satellite service permitted 7.0 - 7.1 MHz.
7.2 to 7.3 MHz access is secondary to other users



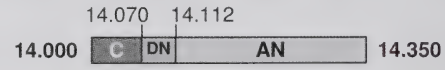
10.100 to 10.150 MHz – 30 metres

KEYS:- also apply to the second page

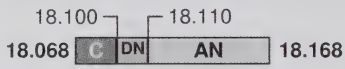
C	= CW or modes less than 1 kHz bandwidth
A	= All modes with bandwidth less than 16 kHz
AN	= All modes with bandwidth less than 6 kHz
AW	= All modes
D	= Data modes with bandwidth less than 16 kHz
DN	= Data modes with bandwidth less than 6 kHz
1	= Standard 1 MHz narrow band segment
	= ATV repeater outputs only – 50 cm
	= Telemetry or telecontrol only – 11 metres
▲	= Repeater input band segment
▼	= Repeater output band segment

ATV = Amateur TeleVision, B = Beacons,
FM = FM simplex, S = Satellites, L = Link

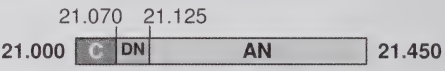
14.000 to 14.350 MHz – 20 metres
Amateur satellite service permitted 14.00-14.25 MHz



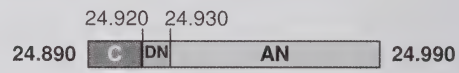
18.068 to 18.168 MHz – 17 metres
Amateur satellite service permitted in whole band



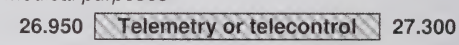
21.000 to 21.450 MHz – 15 metres
Amateur satellite service permitted in whole band



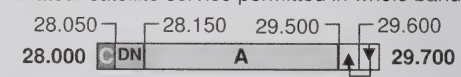
24.890 to 24.990 MHz – 12 metres
Amateur satellite service permitted in whole band



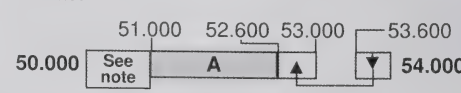
26.950 to 27.300 MHz – 11 metres
Telemetry or telecontrol only, 5 W e.i.r.p. maximum.
Also designated for Industrial, Scientific and Medical purposes



28.000 to 29.700 MHz – 10 metres
Amateur satellite service permitted in whole band



51.000 to 53.000 MHz – 6 metres
SSB/CW calling 52.05 MHz, FM calling 52.525 MHz. 53.6-54 MHz available for MED approved fixed transmitters. See URL : http://www.nzart.org.nz/exam/sg/sn01-regul.html#r11A
Note: Operation between 50 and 51 MHz requires the possession of a MED 6 metre contract.



NOTES: 1. The frequencies at each end of the band blocks are the band limit frequencies;
2. The frequency, giving a point in a band, can be aligned in the centre or at the first or last digit;
Notes continue at bottom of second page

All Frequencies shown in MHz

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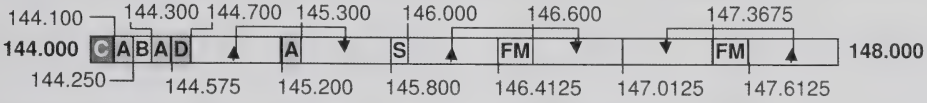
NEW ZEALAND AMATEUR RADIO BANDPLANS P2 OF 2

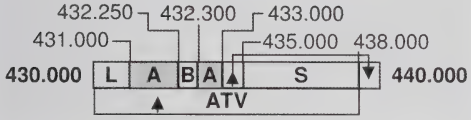
144.000 to 148.000 MHz – 2 metres

Amateur satellite service permitted in the range 144-146 MHz. Oceania SSB calling 144.1 MHz, ZL calling 144.2 MHz, FM calling 144.5 and 146.475 MHz. Primary packet/digipeater 144.65 MHz, other frequencies available. Below 147 MHz, repeater offset -600 kHz, otherwise +600 kHz; Beacons 144.250-144.300 MHz



430.000 to 440.000 MHz – 70 cm

Amateur satellite permitted in the range 435-438 MHz. SSB calling 432.2 MHz, FM calling 432.5 MHz, Beacons 432.25-432.30 MHz. Primary packet/digipeater 432.65 MHz, other frequencies available. Repeater offsets -5 MHz in most cases, +5 MHz otherwise. In general, the ATV repeaters have an input frequency of 431.250 MHz vision, 436.750 MHz FM sound and 437.100 MHz NICAM sound



614.000 to 622.000 MHz – 50 cm TV CH 39

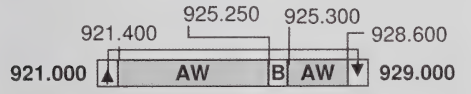
ATV vision carrier 615.25 MHz ITU(R) system G

ATV Repeater Outputs Only

921.000 to 929.000 MHz – 32 cm

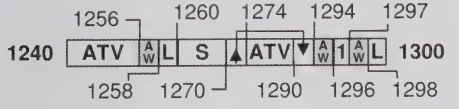
Power 25 W e.i.r.p., SSB calling 925.2 MHz, FM calling 925.5 MHz. Beacons 925.25-925.30 MHz

Also designated for Industrial, Scientific and Medical



1240 to 1300 MHz – 23 cm

SSB calling 1296.2 MHz, FM calling 1296.5 MHz. Beacons 1296.25-1296.30 MHz. ATV video carriers 1241.25, 1249.25, 1275.25 and 1283.25 MHz ITU(R) system G. Repeaters -20 MHz offset. Amateur satellite service in band 1260- 1270 MHz, uplink only

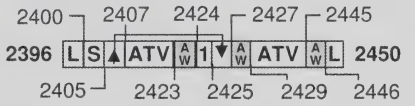


To find the narrow band segment bandplan for the microwave bands, please look for *Simplex and Calling Frequencies* that can be found elsewhere in this Call Book

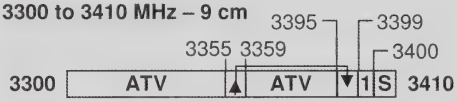
For KEY to codes see page 1

2396 to 2450 MHz – 12 cm

Standard 1 MHz narrow band segment 2424-2425 MHz. SSB calling 2424.2 MHz, FM calling 2424.5 MHz. Beacons 2424.25-2424.30 MHz. ATV in segments 2407-2423 and 2429-2445 MHz, Repeaters -20 MHz offset. Amateur satellite service in 2400-2450 MHz. 2400-2450 MHz is also designated for Industrial, Scientific and Medical (ISM) purposes

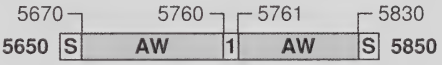


3300 to 3410 MHz – 9 cm

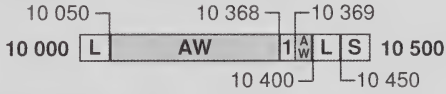


5650 to 5850 MHz – 5 cm

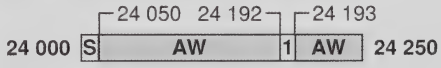
Satellites 5650-5670 MHz earth-to-space only; 5830-5850 MHz space-to-earth only



10 000 to 10 500 MHz – 3 cm

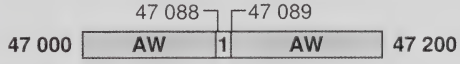


24 000 to 24 250 MHz – 1.2 cm



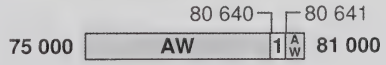
47 000 to 47 200 MHz – 6 mm

Amateur satellite available on the entire band



75 500 to 81 000 MHz – 4 mm

Amateur satellite available on the entire band



Printed on 13/07/2010 3:36 p.m.

NOTES continued:

3. Prepared for the FMTAG by Jamie Pye ZL2NN July 2010.
4. Corrections, updates and suggestions to:zl2nn@nzart.org.nz;
5. Download or view from http://www.nzart.org.nz/maps/2010/bp1-2.pdf

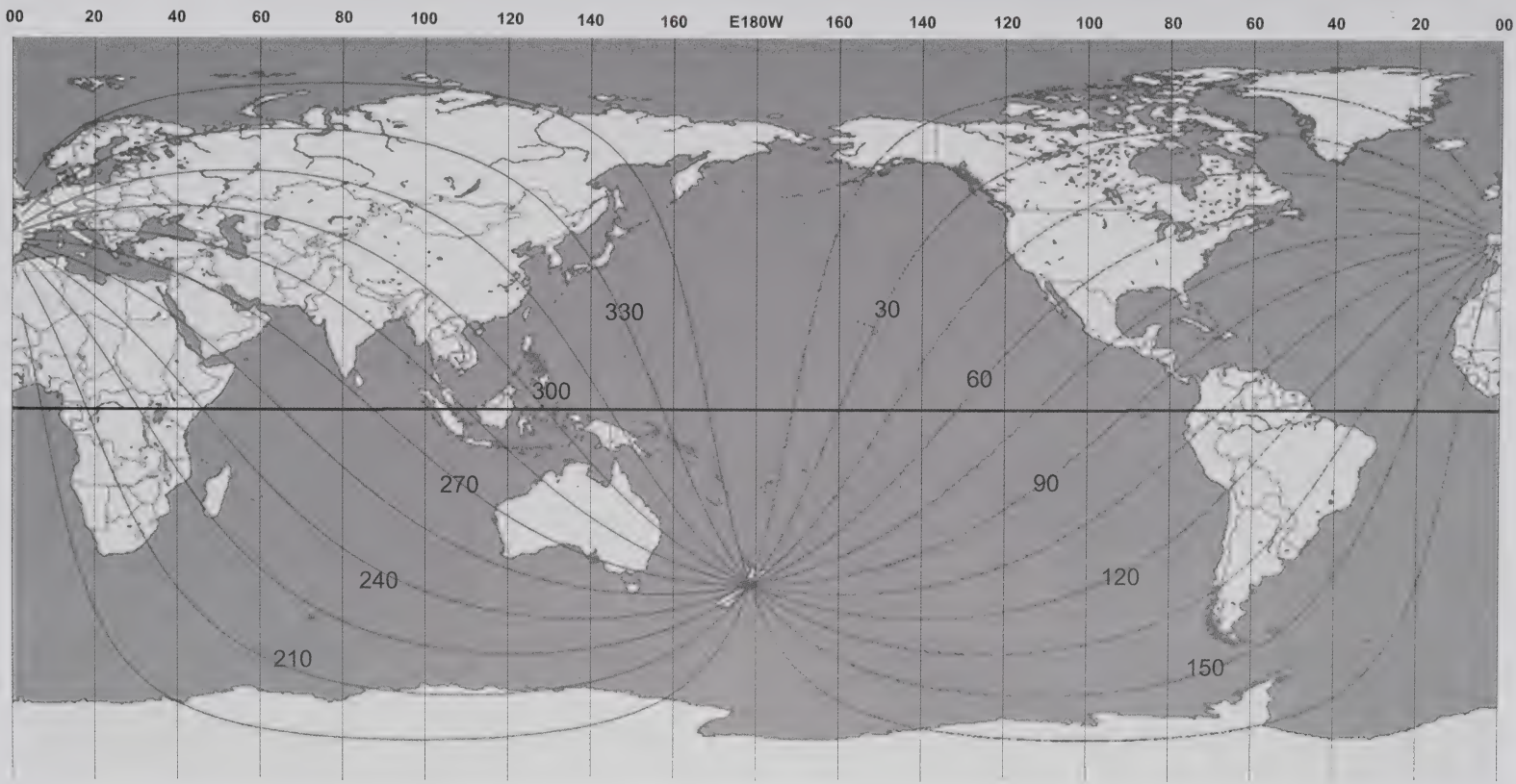
All frequencies shown in MHz

Great Circle DX Bearings Based on Wellington

Listed below are the approximate short path bearings based on the great circle map centred on Wellington. These listings, based on true north, will allow you to aim your directional antenna in the appropriate direction before final adjustment depending on reception. The long path bearings are about 180 degrees in the opposite direction. There are several programmes which allow you to plot and save great circle maps either in polar or rectangular format and centred on any location. These include "Pizza" (www.TonneSoftware.com), "GcmWin" (www.qsl.net/sm3gsj) and an online version at www.gcmap.com in rectangular format.

Prefix	*Entity*	*Azimuth*	*Lat (- S)*	*Long (- E)*	*Dist (km)*
1A	Knights of Malta	280	41.9	12.4	18598
1S	Spratly Island	295	8.8	111.9	8509
3A	Monaco	292	44	7.5	18972
3B6	Agalega - St Brandon	243	10.4	56.6	11542
3B8	Mauritius	237	20.3	57.5	10664
3B9	Rodriguez Island	241	19.8	63.4	10281
3C	Equatorial Guinea	203	1.8	10	15418
3C0	Pagalu Island	196	1.5	5.6	15508
3D2	Fiji Island	6	17	178	2686
3D2C	Conway Reef	358	21.4	174.4	2185
3D2X	Rotuma	5	12.3	177.7	3205
3DA	Swaziland	213	27	31.5	11586
3V	Tunisia	255	36.8	10.2	18654
3W	Vietnam	292	10.8	106.7	9068
3X	Republic of Guinea	164	10	-13	16480
3Y/B	Bouvet Island	185	54.5	3	9373
3Y/P	Peter I Island	153	68.5	-90.5	5987
4J	Azerbaijan	288	40.5	50	15493
4J1	Malyj Vysotskij Is.	325	60.4	28.4	16910
4K2	Franz Josef Land	348	80	50	15157
4L	Georgia	288	41.5	45	15927
4S	Sri Lanka	272	7	79.9	10974
4U1I	ITU Geneva	307	46.2	6.2	18977
4U1U	United Nations HQ/NY	66	40.8	-74	14367
4W6	East Timor	292	8.5	125.6	6070
4X	Israel	267	32	35	16369
5A	Libya	244	32.5	12.5	18227
5B	Cyprus	271	35	33	16679
5H	Tanzania	231	7	39.5	13035
5N	Nigeria	193	6.5	3	16109
5R	Madagascar	230	18.5	47	11524
5T	Mauritania	154	18	-16	17248
5U	Niger	194	13.5	2	16895
5V	Togo	191	6	1.5	16081
5W	Western Samoa	25	13	-172	3355
5X	Uganda	230	1	32.5	14212
5Z	Kenya	233	1.5	37.5	13659
6W	Senegal	152	15	-18	16860
6Y	Jamaica	87	18	-76.8	12803
7O	Yemen	252	13	45	14299
7P	Lesotho	209	29.5	28	11487
7Q	Malawi	222	15	35	12571
7X	Algeria	237	36.7	3	19203
8P	Barbados	105	11.5	-59.5	13782
8Q	Maldive Islands	266	4.4	73.4	11330
8R	Guyana	111	6.8	-58.2	13526
9A	Croatia	294	45.5	15.6	18312
9G	Ghana	188	5.5	-0.2	16048
9H	Malta	258	36	14.4	18275
9J	Zambia	216	15	28	12940
9K	Kuwait	271	29	48	15117
9L	Sierra Leone	165	8.5	-13.2	16312
9M2	West Malaysia	283	3	102	8843
9M6	East Malaysia	296	5	117	7815
9N	Nepal	291	27.5	85	11998
9Q	Zaire	207	4.3	15.3	14588
9U	Burundi	223	3	29	14053
9V	Singapore	283	1.3	103.8	8568
9X	Rwanda	226	1.5	30	14136
9Y	Trinidad - Tobago Is	104	11	-62.5	13501
A2	Botswana	210	22	25	12371
A3	Republic of Tonga	25	21	-175	2410
A4	Oman	272	23.5	59	13864
A5	Bhutan	295	28	90	11646
A6	United Arab Emirates	272	25.3	55.3	14287
A7	Qatar	269	25.3	51.5	14606
A9	Bahrain	270	26	50.5	14732
AP	Pakistan	279	25	67	13291
BS7	Scarborough Reef	303	15.1	117.5	8616
BV	Taiwan	313	25	122	9173
BV9	Pratas Island	306	20.7	116.7	9144
BY	China	319	40	116.4	10801
C2	Nauru	347	0.5	166.9	4587
C3	Andorra	290	42.5	1.5	19485
C5	The Gambia	156	13	-17	16688
C6	Bahamas	81	25	-77.5	13205
C9	Mozambique	215	26	33	11614
CE	Chile	130	33.5	-70.8	9329
CE0A	Easter Island	104	28	-109	6877
CE0X	San Felix	119	26	-80	9276
CE0Z	Juan Fernandez	125	33.6	-78.8	8789
CE9	Antarctica	167	80	-120	5049
CN	Morocco	161	33	-8	19088
CO	Cuba	79	23.1	-82.4	12677
CP	Bolivia	120	16.5	-68.4	10873
CT	Portugal	123	38.7	-9.2	19566
CT3	Madeira Island	125	33	-17	18620
CU	Azores Islands	94	38	-25	18259
CX	Uruguay	140	34.9	-56.2	10076
CY0	Sable Island	67	43.8	-60	15562
CY9	St. Paul Island	62	47.2	-60.1	15645
D2	Angola	203	8.8	13.2	14186
D4	Rep. of Cape Verde	141	16	-24	16682
D6	Comoros	232	11.8	43.7	12332
DL	Fed. Rep. of Germany	327	51	6	18645
DU	Philippines	306	14.6	121	8331
E3	Eritrea	243	9	38.7	14472
E4	Palestine	267	32	35	16369
EA	Spain	231	40.4	-3.7	19916
EA6	Balearic Islands	258	39.5	3	19349
EA8	Canary Islands	144	28	-15	18301
EA9	Ceuta - Melilla	175	35.9	-5.3	19454
EI	Ireland	4	53.3	-6.3	18657
EK	Armenia	286	40.5	44.5	15935
EL	Liberia	169	7	-11	16190
EP	Iran	282	35.8	51.8	15151
ER	Moldova	295	47	28.8	17286
ES	Estonia	325	59.4	24.8	17140
ET	Ethiopia	243	9	38.7	14472
EU	Belarus	312	54	27.5	17243
EX	Kyrgzstan	301	42.9	74.6	13720
EY	Tajikistan	294	39.5	67	14116
EZ	Turkmenistan	288	38	58	14750
F	France	330	48.8	2.3	19001
FG	Guadeloupe	100	16	-61.7	13928
FH	Mayotte	232	13	45.3	12120
FJ	St Martin Island	97	18	-63	13959
FK	New Caledonia	336	22.3	166.5	2240
FK/C	Chesterfield Islands	321	19.9	158.3	2847
FM	Martinique	101	14.6	-61	13886
FO	French Polynesia	62	17.6	-150	4213
FO/A	Austral Islands	70	24	-150	3733
FO/C	Clipperton Island	73	10.3	-109.2	9579
FO/M	Marquesas Islands	64	9	-139.5	5690
FP	St Pierre - Miquelon	63	46.7	-56	15940
FR	Reunion Island	235	21	55.5	10744
FR/G	Glorioso Island	235	10.6	47.3	12194
FR/J	Juan de Nova	223	21.5	40	11677
FR/T	Tromelin Island	238	15.5	54.5	11274
FT8W	Crozet Island	216	46	52	8829
FT8X	Kerguelen Island	222	50	70	7562
FT8Z	Amsterdam - St Paul	236	37	77.6	7973
FW	Wallis - Futuna Is.	18	14	-176	3124
FY	French Guiana	117	5	-52	13858
G	England	345	51.5	-0.1	18810
GD	Isle of Man	359	54	-4.5	18584
GI	Northern Ireland	3	54.6	-5.9	18515
GJ	Jersey	349	49.3	-2.2	19086
GM	Scotland	357	56	-3.2	18358
GU	Guernsey	351	49.5	-2.7	19072
GW	Wales	355	51.5	-3.2	18856
H4	Solomon Islands	333	9.4	160	3826
H40	Temotu	342	10.4	165.5	3540
HA	Hungary	299	47.5	19.1	18006
HB	Switzerland	308	47	7.5	18847
HB0	Liechtenstein	306	47.2	9.6	18695
HC	Ecuador	101	0.2	-78	11394
HC8	Galapagos Islands	93	0.5	-90.5	10332
HH	Haiti	90	18.5	-72.2	13223
HI	Dominican Republic	91	18.5	-70	13407
HK	Colombia	100	4.6	-74.1	12074
HK0M	Malpelo Island	96	4	-81.1	11448
HK0S	San Andres Island	89	12.5	-81.7	12010
HL	South Korea	324	37.5	127	10021
HP	Panama	93	9	-79.5	11945
HR	Honduras	84	14	-87.2	11655
HS	Thailand	290	13.8	100.5	9785
HV	Vatican City	280	41.9	12.5	18590

HZ	Saudi Arabia	270	26.3	50	14792
I	Italy	280	41.9	12.5	18590
IS	Sardinia	265	39.2	9.1	18834
J2	Djibouti	249	11.6	43.2	14335
J3	Grenada	103	12	-61.8	13632
J5	Guinea-Bissau	159	11.9	-15.6	16617
J6	St. Lucia	102	13.9	-61	13836
J7	Dominica	100	15.4	-61.3	13919
J8	St. Vincent	102	13.3	-61.3	13768
JA	Japan	332	35.7	139.8	9273
JD/M	Minami Torishima	339	24.3	154	7593
JD/O	Ogasawara	329	27.5	141	8403
JT	Mongolia	319	47.9	106.9	11960
JW	Svalbard	354	78.8	16	15727
JX	Jan Mayen	2	71	-8.3	16686
JY	Jordan	268	32	35.9	16294
K	United States	58	37.7	-98.7	12362
KC6	Belau West Carolines	317	9.5	138.2	6783
KG4	Guantanamo Bay	87	19.9	-75	13081
KH0	Mariana Is. Saipan	331	15.2	148.8	6825
KH1	Baker - Howland Is.	13	0.5	-176	4704
KH2	Guam Island	326	13.5	144.8	6829
KH3	Johnston Island	18	17	-168.5	6670
KH4	Midway Island	7	28.2	-177.4	7739
KH5	Palmyra Island	29	5.9	-162.1	5708
KH5K	Kingman Reef	28	7.5	-162.8	5846
KH6	Hawaii	27	21.3	-157.9	7468
KH7	Kure Island	6	28.4	-178.4	7752
KH8	American Samoa	28	14.3	-170.8	3265
KH8/S	Swains Island	26	11.1	-171.1	3587
KH9	Wake Island	351	19.3	166.6	6772
KL7	Alaska	17	61.2	-150	11800
KP1	Navassa Island	88	18.4	-75	12981
KP2	US Virgin Islands	95	18.3	-64.9	13821
KP4	Puerto Rico	94	18.5	-66.2	13726
KP5	Desecheo Island	93	18.3	-67.5	13603
LA	Norway	338	60	10.7	17664
LU	Argentina	138	34.6	-58.4	9982
LX	Luxembourg	322	49.6	6.2	18749
LY	Lithuania	314	54.5	25.5	17347
LZ	Bulgaria	284	42.7	23.3	17708
OA	Peru	111	12.1	-77.1	10561
OD	Lebanon	271	33.9	35.5	16420
OE	Austria	303	48.2	16.3	18188
OH	Finland	326	60.2	25	17082
OH0	Aland Island	330	60.2	20	17304
OJ0	Market Reef	331	60.3	19	17338
OK	Czech Republic	311	50.1	14.4	18236
OM	Slovak Republic	306	49.1	16.4	18148
ON	Belgium	330	50.9	4.4	18724
OX	Greenland	33	64.2	-51.7	16088
OY	Faroe Islands	3	62	-6.8	17690
OZ	Denmark	328	55.7	12.6	17964
P2	Papua New Guinea	315	5.2	145.6	4960
P4	Aruba	98	12.1	-69	13045
P5	North Korea	324	39	126	10208
PA	Netherlands	333	52.4	4.9	18567
PJ2	Netherland Antilles	98	12.1	-69	13045
PJ7	Saint Maarten - Saba	97	17.7	-63.2	13922
PY	Brazil	143	23	-43.2	11870
PY0F	Fernando de Noronha	144	3.9	-32.4	14292
PY0S	St Peter - Paul Rock	144	1	-29.4	14929
PY0T	Trindade - Martin Is	155	20.5	-29.3	12725
PZ	Surinam	114	5.8	-55.2	13680
S0	Western Sahara	159	17	-14	17210
S2	Bangladesh	291	23.7	90.4	11311
S5	Slovenia	290	44.5	16.4	18264
S7	Seychelles	246	4.6	55.5	12095
S9	Sao Tome - Principe	197	0.3	6.7	15351
SM	Sweden	330	59.3	18.1	17450
SP	Poland	311	52.2	21	17720
ST	Sudan	243	15.5	32.5	15461
SU	Egypt	261	30	31.4	16562
SV	Greece	271	38	23.7	17575
SV/A	Mount Athos	277	40.2	24.3	17585
SV5	Dodecanese	271	36.4	28.2	17140
SV9	Crete	266	35.4	25.5	17326
T2	Tuvalu	6	8.7	178.6	3612
T30	West Kiribati	357	1.4	173.2	4725
T31	Central Kiribati	21	2.8	-171.7	4449
T32	East Kiribati	37	1.9	-157.4	5519
T33	Banaba Island	351	0.5	169.4	4548
T5	Somalia	243	2.1	45.4	13405
T7	San Marino	289	43.9	12.3	18596
T9	Bosnia-Hercegovina	286	43.5	18.3	18117
TA	Turkey	280	40	31	17024
TF	Iceland	18	64.1	-22	17228
TG	Guatemala	82	14.6	-90.5	11423
TI	Costa Rica	89	9.9	-84	11632
TI9	Cocos Island	91	5.6	-87	11070
TJ	Cameroon	206	3.9	11.5	15589
TK	Corsica Island	280	42	9	18879
TL	Central African Rep.	215	4.5	18	15373
TN	Congo	207	4.3	15.3	14588
TR	Gabon	201	0.5	9	15310
TT	Chad	217	12.1	15	16277
TU	Ivory Coast	181	5.5	-4	16073
TY	Benin	192	6.3	2.3	16100
TZ	Mali	173	12.7	-8	16859
UA	European Russia	313	55.8	37.6	16569
UA0	Asiatic Russia	335	48.5	135.1	10714
UA2	Kaliningrad	319	55	20.5	17613
UJ	Uzbekistan	294	39.5	67	14116
UN	Kazakhstan	302	43.3	76.9	13575
UR	Ukraine	303	50.4	30.5	17131
V2	Antigua - Barbuda	100	17	-59.8	14155
V3	Belize	80	17.3	-88.8	11754
V4	St. Kitts - Nevis	98	17.3	-62.6	13944
V5	Namibia	202	22.6	17.1	12597
V6	Micronesia ECI	338	8	158.3	5725
V7	Marshall Islands	350	9.1	167.3	5637
V8	Brunei	294	4.9	114.9	7967
VE	Canada	60	43.7	-79.4	14097
VK	Australia	268	37.8	145	2613
VK0H	Heard Island	221	53	73.4	7173
VK0M	Macquarie Island	213	54.7	158.8	1945
VK9L	Lord Howe Island	301	31.6	159.1	1784
VK9M	Mellish Reef	319	17.6	155.8	3202
VK9N	Norfolk Island	331	29	168	1492
VK9W	Willis Island	311	16	149.5	3726
VK9X	Christmas Island	275	10.5	105.7	7538
VK9Y	Cocos-Keeling Island	268	12.2	96.8	8164
VP2E	Anguilla	96	18.3	-63	13980
VP2M	Montserrat	98	16.8	-62.2	13943
VP2V	British Virgin Is.	95	18.4	-64.6	13853
VP5	Turks - Caicos Is.	87	22	-72	13471
VP6	Pitcairn Island	88	25.1	-130.1	5299
VP6/D	Ducie Is.	91	24.7	-124.8	5769
VP8	Falkland Islands	149	51.7	-57.9	8502
VP8G	South Georgia Island	161	54.3	-38.8	8934
VP8H	South Shetland Is.	156	62	-58.3	7602
VP8O	South Orkney Island	160	60.6	-45.5	8128
VP8S	South Sandwich Is.	168	57.8	-26.7	8842
VP9	Bermuda	80	32.3	-64.7	14693
VQ9	Chagos Island	256	7.3	72.4	10545
VR	Hong Kong	306	22.3	114.3	9441
VU	India	277	19	72.8	12414
VU7A	Andaman Island Is.	284	11.7	92.8	10245
VU7L	Laccadive Islands	270	10	73	11769
XE	Mexico	72	19.4	-99.1	11062
XF4	Revilla Gigedo	65	19	-111.5	10064
XT	Burkina Faso	186	12.4	-1.6	16827
XU	Cambodia	292	11.7	104.8	9286
XW	Laos	295	18	102.6	9944
XX9	Macao	305	22.2	113.6	9481
XZ	Myanmar	290	16.8	96	10366
YA	Afghanistan	289	34.4	69.2	13674
YB	Indonesia	280	6.2	106.8	7760
YI	Iraq	275	33	44.5	15623
YJ	Vanuatu	344	17.7	168.3	2680
YK	Syria	270	33.5	36.3	16334
YL	Latvia	321	57	24	17315
YN	Nicaragua	86	12	-86	11614
YO	Romania	289	44.4	26.1	17494
YS	El Salvador	83	13.7	-89.2	11467
YT	Montenegro	284	42.8	19.5	18018
YU	Montenegro	284	42.8	19.5	18018
YU	Yugoslavia	290	44.9	20.5	17937
YV	Venezuela	101	10.5	-67	13095
YV0	Aves Island	98	15.7	-63.7	13741
YZ	Montenegro	284	42.8	19.5	18018
Z2	Zimbabwe	217	17.8	31	12515
Z3	Macedonia	290	44.5	16.4	18264
ZA	Albania	279	41.3	19.8	17979
ZB	Gibraltar	174	36.1	-5.4	19476
ZC4	British Cyprus	270	34.6	33	16662
ZD7	Saint Helena Island	179	16	-5.9	13681
ZD8	Ascension Island	167	8	-14.4	14483
ZD9	Tristan Da Cunha	174	37.1	-12.3	11300
ZF	Cayman Islands	83	19.5	-81.2	12536
ZK/N	North Cook Islands	41	10.4	-161	4126
ZK/S	South Cook Islands	54	21.2	-159.8	3219
ZK2	Niue	36	19	-168.9	2876
ZK3	Tokelau Islands	21	8.4	-172.7	3819
ZL	New Zealand	218	43.5	172.6	351
ZL7	Chatham Island	119	44	-176.5	751
ZL8	Kermadec Island	27	29.3	-177.9	1444
ZL9	Auckland - Campbell	209	50.7	166.5	1270
ZP	Paraguay	133	25.3	-57.7	10846
ZS	South Africa	199	33.9	18.4	11360
ZS8	Prince Edward/Marion	208	46.8	37.8	9388



GREAT CIRCLE BEARINGS FROM WELLINGTON.

QRP operation has a long history in New Zealand, in its many different forms, which include not only home constructing of equipment and lower power DX successes but also for portable use such as in the back country.

The origins

QRP is an abbreviation from the old official Q code that was used to speed up communications especially when using different languages and transmitting CW (Morse). These codes go right back to the days of spark transmissions.

QRP? = Shall I decrease transmitter power?

QRP, = with no question mark = Decrease transmitter power!

What watts is QRP?

Today QRP means operating with a transmitter output power of no more than 5 watts. Many hams get excellent results using much less even way down below 1 watt!

Many of the new digital modes such as PSK31 and Whisper, get surprising results using low power, in fact in most cases that's all that is needed.

With today's test equipment it is much easier to measure output power than to perform meaningful and accurate input calculations.

QRP Gear

Traditionally QRP gear has been homemade (homebrew), today many use low power commercial rigs. There are also now a large selection of kits available, some can be purchased as a bare bones kit making them much more economical, But there now seems to be a resurgent's in building gear from scratch, from very simple rigs such as the Tuna tin 2 to multiband transceivers using more sophisticated technologies such as DDS.

The challenge of QRP

QRP appears to be one area of amateur radio that is expanding, one only has to look on the internet to see the very large number of sites dedicated to QRP operation through out the world. The large increase in the number of QRP kitsets available has help to boost the interest and an interesting situation that has come about it that many of these kits feature in "how to build it" video's on the web site "You Tube". There are even sites for QRP home-brewers that have calculators for working out turns for coils, band-pass filter calculations and many more.

There is a real feeling of satisfaction when one has just completed a DX contact on QRP especially when it has been made on a set you have built yourself. There are a number of contest which include a QRP section such as our own Jock White Memorial Field day, also there are the "Straight key night' and the VK trans Tasman Contest along with the Trans-Tasman CW and digital modes contest with QRP sections. For a a straight QRP contest there is the VK QRP hours Contest.

SSB QRP Transceiver

The ZL scene

Following a series of adverts in *"Break In"* for expressions of interest in forming a ZL QRP group which received an excellent response, a group has been formed.. The first group newsletter was published at the beginning of July 2010 and appears to have been well received. It is hoped to produce at least four per year.

The group has attracted hams from across all fields of QRP with a large number of people very keen on building there own gear. It has been decided to provide a service within the group for obtaining parts from group purchasing , also technical help from the more advanced technical members of the group. Two or three people are looking into the QRP awards and contest situation in New Zealand.

If you are a keen QRP operator or equipment builder and would like to join the group do not hesitate to contact us via the contact details below.

A number of informal QRP nets take place on both 40 and 80 metres. The ZL-QRP group have decided meantime to use 3690kHz as its SSB listening frequency which is an internationally recognised QRP frequency.

Some members of the ZL-QRP group are keen trampers and from time to time can be heard from outdoor locations such as the Tararua Ranges, Nelson lakes, Stewart Island and many others. The availability of small light weight rigs and the ability to make small home brew rigs today have made this a much more interesting concept .

If interested in joining the ZL-QRP group contact -Phil Tarrant ZL2NJ, P.O. Box 55, Wanganui 4540, or Email philtar@xtra.co.nz.

Also contact Phil Zl2NJ to join the G-QRP club or to purchase the G-QRP clubs latest CD which includes all copies of Sprat from issue 1 to issue 140.

DSB QRP Transceiver

The GQRP Club

Formed in 1974, the GQRP Club is a non profit organisation run entirely by volunteers to promote Low Power Radio. Whether you have a ham license or not–everyone is welcome. Our quarterly magazine SPRAT provides a fascinating read containing articles of varying complexity, from simple test equipment, to fully functioning radio transmitters and receivers. Membership fees are about as low as you will find anywhere and our club sales service to members is second to none.

New Zealand membership Cost $NZ28.00, contact :- Phil Tarrant ZL2NJ, P.O. Box 55, Wanganui 4540. Email—Philtar@xtra.co.nz, to join or for further details.

Communication with neighbouring stations by ground waves is not affected by conditions in the upper atmosphere. In contrast all HF communications beyond, at the most, a few tens of kilometres depend on the presence of a layer of gases so strongly ionized as to act as a reflector for skywave signals. These signals projected at the correct angle, will be directed down to the desired destination, either in one hop or by successive hops around the curvature of the earth.

The ionization of the atmospheric gases is renewed each day by ultra-violet radiation from the sun. In the lowest layers (D and E) the density of ions decreases rapidly as the sun goes down, but in the higher F region the ionisation lasts longer and diminishes slowly through the night. The strength of the ionising radiation itself is liable to fluctuate from day to day and week to week. Observatories monitor the state of the ionosphere by sweeping through the HF spectrum with pulses directed vertically upward, timing the echoes to determine the virtual height of the reflecting layer, and noting the critical penetration frequency (f0) above which reflections cease.

Radio waves impinging obliquely on the ionised layer can be reflected on higher frequencies that are related to f0 by an obliquity factor.

Thus, for example, with an F layer at 300 km, the required radiation angle above the horizon and the maximum usable frequency (MUF) for various distances would be:

0 km 90° 1.0 × f0
500 km 48° 1.3 × f0
1,000 km 28° 1.9 × f0
2,000 km 14° 2.7 × f0
3,000 km 4° 3.4 × f0

For instance, when the critical frequency (f0) is 3 MHz the MUF for a 1000 km path is 1.9 × 3 MHz = 5.7 MHz.

This path would be useable on 40 m (MUF = 7 MHz) if the critical frequency increased to 7 ÷ 1.9 = 3.7 MHz.

Signals suffer power loss at every reflection and at every passage through the daytime D and E regions. The lower the frequency the more severe the loss—halving the frequency quadruples the loss. The lowest frequency to give a readable signal at the other end, in spite of losses, depends in part on the effective power radiated at the appropriate angle. Thus the lowest usable frequency (LUF) or absorption-limited frequency (ALF) is not a sharply defined limit applying to all stations like the MUF.

The IARU-NCDXF[1] worldwide network of beacons in continuous operation on five amateur bands, and cycling through four power levels, provides a convenient means of sampling current propagation conditions to other parts of the world (see Figure 1 overleaf). The full 18-beacon sequence on any band can be scanned in only three minutes.

For planning ahead it is usual to make use of predictions of the MUF and LUF based on the historical data provided by ionospheric observatories and averaged for different levels of solar activity.

For a long time the main indicator of solar activity was the sunspot number, but the measurements of microwave radiation from the sun, begun at Ottawa in 1946, have proved more relevant to ionospheric conditions. The solar flux index is the measurement made at local noon (now at Penticton, British Colombia) on 2.8 GHz.[2]

This is not the ionising radiation, but is something measurable at the ground that seems to vary in parallel with the ionizing radiations that maintain the ionosphere.

If an estimate can be made of the level of solar activity likely to apply at the time of interest, computers can sort through the world maps of averaged past data and extract the most probable MUFs at the required reflection points, at the relevant time, month and activity level. With considerable simplification, some very convenient programs have been produced for PCs.[3] Most try to predict median values of MUF for a path, but to allow for the normal day-to-day variations of ionospheric conditions over a month many also indicate the expected upper decile (UD) value of MUF (likely to be exceeded on about 10 per cent of days) and the lower decile (LD) values (below which the MUF is likely to fall on the worst 10 per cent of days).

Commercial stations normally set their frequencies some distance below the expected median MUFs to minimise the disruptions of schedules on "bad" days, and for this purpose often designate the LD as their optimum working frequency (OWF). This, however, is a compromise frequency — the best propagation is normally to be found just below the actual MUF at the time, which on a "good" day may be 15 per cent or more above the predicted median MUF. Although predictions of median MUFs such as those in *Break-In* may not always fit conditions on particular days very well, the predictions will still give useful indications of the best and worst times to try to communicate with distant places.

Most HF communications within New Zealand are by single-hop sky wave, requiring a medium to high take-off angle. Most amateur contacts need radiation angles above 40–45°, few need radiation below 30° to reach the remainder of the country.

At the steep angles needed for nearby communications, signals on the higher frequency bands will penetrate the ionized layers and be lost to space, though lower-angled rays may still be reaching more distant stations. This skip over surrounding areas is most frequent and extensive when the ionisation is weak, notably at night, in the winter winter, and in the years of low activity. Amateurs (including AREC) can usually keep nearby contacts on the 3.5 MHz band, while SAR and CD can change to their lower "night" frequencies. In contrast to local communications, long distance contacts are favoured by the lowest practicable radiation angles in order to maximise the usable frequency, minimise the number of hops needed, and avoid unnecessary absorption losses.

Bursts of X-rays from solar flares can cause immediate intensifiction of ionisation, notably in the D-region, over sunlit portions of the earth, causing sudden shortwave fadeouts. Clouds of charged particles ejected from the sun, and travelling more slowly, may be by satellite as a satellite protonevent (SPE); they can interact with the earth's magnetic field, causing distortions of the field that are indicated by increases in the three-hourly geomagnetic K-index and the 24-hourly A-index, and themselves be deflected towards the magnetic poles to produce enhanced auroral displays, degraded radio propagation across the auroral zone, and perhaps severe polar cap absorption (PCA).[4]

Summary

For long distance contacts use the lowest practicable radiation angle and the highest frequency usable at the time; listen to the beacons for an overview of propagation in different directions (and take great care not to transmit on the beacon frequencies!); listen to the hourly broadcasts from WWV[5] or WWVH for the solar flux and K and A indices (and do not expect great propagation across the auroral regions if the geomagnetic field is disturbed); consult monthly predictions of median MUFs in *Break-In* or on PCs but be prepared for MUFs to be 15 per cent or more above the predicted medians on good days and 15 per cent or more below on bad days.

For domestic communications within New Zealand expect to do best with a medium to high radiation angle and a frequency low enough to avoid skip over the desired paths, but still use the highest band that is usable in order to minimise losses and multipath fading.

References

[1] The Northern California DX Foundation website (<www.ncdxf.org>) has pages on beacons, including sites, call-signs, schedules, propagation software and software to monitor the beacons using a sound card.

[2] The Penticton/Ottawa 2.8 GHz solar flux index observations are now displayed on [4] below. Select "Solar cycle progression" in the "Popular pages" box.

[3] Propagation prediction software is available through links on most websites in this reference list.

[4] "Space weather" is the current jargon for solar activity and its influence on the earth. One web site is the Space Weather Prediction Center of the US National Oceanic and Atmospheric Administration (<www.swpc.noaa.gov>). The NZART website also has the NOAA solar-terrestrial data, updated every three hours.

[5] There is a WWV website at www.tf.nist.gov.

Learning about propagation

The RSGB Propagation Studies Committee has a very comprehensive website at <www.keele.ac.uk/depts/por/psc.htm> with a listing "relating to radio propagation at all levels from introductory to professional". There are also numerous links to web sites in this list, and to many others related to propagation.

Two ionospheric organisations who are responsible for collecting ionospheric observations also have very good education sections on propagation. They are <www.swpc.noaa.gov> (see [4] above) and the Australian Space Weather Agency (<www.ips.gov.au>).

The latest hourly ionogram from the Eyrewell ionosonde near Christchurch is available at (<www2.phys.canterbury.ac.nz/~physion/ionogram.html>).

ALLOCATION OF INTERNATIONAL CALL-SIGNS

Reproduced courtesy ITU, revised August 2007

Call Sign Series	*Allocated to*
AAA-ALZ	United States of America
AMA-AOZ	Spain
APA-ASZ	Pakistan (Islamic Republic of)
ATA-AWZ	India (Republic of)
AXA-AXZ	Australia
AYA-AZZ	Argentine Republic
A2A-A2Z	Botswana (Republic of)
A3A-A3Z	Tonga (Kingdom of)
A4A-A4Z	Oman (Sultanate of)
A5A-A5Z	Bhutan (Kingdom of)
A6A-A6Z	United Arab Emirates
A7A-A7Z	Qatar (State of)
A8A-A8Z	Liberia (Republic of)
A9A-A9Z	Bahrain (State of)
BAA-BZZ	China (People's Republic of)
CAA-CEZ	Chile
CFA-CKZ	Canada
CLA-CMZ	Cuba
CNA-CNZ	Morocco (Kingdom of)
COA-COZ	Cuba
CPA-CPZ	Bolivia (Republic of)
CQA-CUZ	Portugal
CVA-CXZ	Uruguay (Eastern Republic of)
CYA-CZZ	Canada
C2A-C2Z	Nauru (Republic of)
C3A-C3Z	Andorra (Principality of)
C4A-C4Z	Cyprus (Republic of)
C5A-C5Z	Gambia (Republic of the)
C6A-C6Z	Bahamas (Commonwealth of)
* C7A-C7Z	World Meteorological Organisation
C8A-C9Z	Mozambique (Republic of)
DAA-DRZ	Germany (Federal Republic of)
DSA-DTZ	Korea (Republic of)
DUA-DZZ	Philippines (Republic of the)
D2A-D3Z	Angola (Republic of)
D4A-D4Z	Cape Verde (Republic of)
D5A-D5Z	Liberia (Republic of)
D6A-D6Z	Comoros (Islamic Federal Republic of the)
D7A-D9Z	Korea (Republic of)
EAA-EHZ	Spain
EIA-EJZ	Ireland
EKA-EKZ	Armenia (Republic of)
ELA-ELZ	Liberia (Republic of)
EMA-EOZ	Ukraine
EPA-EQZ	Iran (Islamic Republic of)
ERA-ERZ	Moldova (Republic of)
ESA-ESZ	Estonia (Republic of)
ETA-ETZ	Ethiopia (Federal Democratic Republic of)
EUA-EWZ	Belarus (Republic of)
EXA-EXZ	Kyrgyz Republic
EYA-EYZ	Tajikistan (Republic of)
EZA-EZZ	Turkmenistan
E2A-E2Z	Thailand
E3A-E3Z	Eritrea
** E4A-E4Z	Palestinian Authority
E5A-E5Z	New Zealand - Cook Islands (WRC-07)
E7A-E7Z	Bosnia and Herzegovina (Republic of) (WRC-07)
FAA-FZZ	France
GAA-GZZ	United Kingdom of Great Britain and Northern Ireland
HAA-HAZ	Hungary (Republic of)
HBA-HBZ	Switzerland (Confederation of)
HCA-HDZ	Ecuador
HEA-HEZ	Switzerland (Confederation of)
HFA-HFZ	Poland (Republic of)
HGA-HGZ	Hungary (Republic of)
HHA-HHZ	Haiti (Republic of)
HIA-HIZ	Dominican Republic
HJA-HKZ	Colombia (Republic of)
HLA-HLZ	Korea (Republic of)
HMA-HMZ	Democratic People's Republic of Korea
HNA-HNZ	Iraq (Republic of)
HOA-HPZ	Panama (Republic of)
HQA-HRZ	Honduras (Republic of)
HSA-HSZ	Thailand
HTA-HTZ	Nicaragua
HUA-HUZ	El Salvador (Republic of)
HVA-HVZ	Vatican City State
HWA-HYZ	France
HZA-HZZ	Saudi Arabia (Kingdom of)
H2A-H2Z	Cyprus (Republic of)
H3A-H3Z	Panama (Republic of)
H4A-H4Z	Solomon Islands
H6A-H7Z	Nicaragua
H8A-H9Z	Panama (Republic of)
IAA-IZZ	Italy
JAA-JSZ	Japan
JTA-JVZ	Mongolia
JWA-JXZ	Norway
JYA-JYZ	Jordan (Hashemite Kingdom of)
JZA-JZZ	Indonesia (Republic of)
J2A-J2Z	Djibouti (Republic of)
J3A-J3Z	Grenada
J4A-J4Z	Greece
J5A-J5Z	Guinea-Bissau (Republic of)
J6A-J6Z	Saint Lucia
J7A-J7Z	Dominica (Commonwealth of)
J8A-J8Z	Saint Vincent and the Grenadines
KAA-KZZ	United States of America
LAA-LNZ	Norway
LOA-LWZ	Argentine Republic
LXA-LXZ	Luxembourg
LYA-LYZ	Lithuania (Republic of)
LZA-LZZ	Bulgaria (Republic of)
L2A-L9Z	Argentine Republic
MAA-MZZ	United Kingdom of Great Britain and Northern Ireland
NAA-NZZ	United States of America
OAA-OCZ	Peru
ODA-ODZ	Lebanon
OEA-OEZ	Austria
OFA-OJZ	Finland
OKA-OLZ	Czech Republic
OMA-OMZ	Slovak Republic
ONA-OTZ	Belgium
OUA-OZZ	Denmark
PAA-PIZ	Netherlands (Kingdom of the)
PJA-PJZ	Netherlands (Kingdom of the) - Netherlands Antilles
PKA-POZ	Indonesia (Republic of)
PPA-PYZ	Brazil (Federative Republic of)
PZA-PZZ	Suriname (Republic of)
P2A-P2Z	Papua New Guinea
P3A-P3Z	Cyprus (Republic of)
P4A-P4Z	Netherlands (Kingdom of the) - Aruba
P5A-P9Z	Democratic People's Republic of Korea
RAA-RZZ	Russian Federation
SAA-SMZ	Sweden
SNA-SRZ	Poland (Republic of)
SSA-SSM	Egypt (Arab Republic of)
SSN-STZ	Sudan (Republic of the)
SUA-SUZ	Egypt (Arab Republic of)
SVA-SZZ	Greece
S2A-S3Z	Bangladesh (People's Republic of)
S5A-S5Z	Slovenia (Republic of)
S6A-S6Z	Singapore (Republic of)
S7A-S7Z	Seychelles (Republic of)
S8A-S8Z	South Africa (Republic of)
S9A-S9Z	Sao Tome and Principe (Democratic Republic of)
TAA-TCZ	Turkey
TDA-TDZ	Guatemala (Republic of)
TEA-TEZ	Costa Rica
TFA-TFZ	Iceland
TGA-TGZ	Guatemala (Republic of)
THA-THZ	France
TIA-TIZ	Costa Rica
TJA-TJZ	Cameroon (Republic of)
TKA-TKZ	France
TLA-TLZ	Central African Republic
TMA-TMZ	France
TNA-TNZ	Congo (Republic of the)
TOA-TQZ	France
TRA-TRZ	Gabonese Republic
TSA-TSZ	Tunisia
TTA-TTZ	Chad (Republic of)
TUA-TUZ	Côte d'Ivoire (Republic of)
TVA-TXZ	France
TYA-TYZ	Benin (Republic of)
TZA-TZZ	Mali (Republic of)
T2A-T2Z	Tuvalu
T3A-T3Z	Kiribati (Republic of)
T4A-T4Z	Cuba
T5A-T5Z	Somali Democratic Republic
T6A-T6Z	Afghanistan (Islamic State of)
T7A-T7Z	San Marino (Republic of)
T8A-T8Z	Palau (Republic of)
UAA-UIZ	Russian Federation
UJA-UMZ	Uzbekistan (Republic of)
UNA-UQZ	Kazakhstan (Republic of)
URA-UZZ	Ukraine
VAA-VGZ	Canada
VHA-VNZ	Australia
VOA-VOZ	Canada
VPA-VQZ	United Kingdom of Great Britain and Northern Ireland
VRA-VRZ	China (People's Republic of) - Hong Kong
VSA-VSZ	United Kingdom of Great Britain and Northern Ireland
VTA-VWZ	India (Republic of)
VXA-VYZ	Canada
VZA-VZZ	Australia
V2A-V2Z	Antigua and Barbuda
V3A-V3Z	Belize
V4A-V4Z	Saint Kitts and Nevis
V5A-V5Z	Namibia (Republic of)
V6A-V6Z	Micronesia (Federated States of)
V7A-V7Z	Marshall Islands (Republic of the)
V8A-V8Z	Brunei Darussalam
WAA-WZZ	United States of America
XAA-XIZ	Mexico
XJA-XOZ	Canada
XPA-XPZ	Denmark
XQA-XRZ	Chile
XSA-XSZ	China (People's Republic of)
XTA-XTZ	Burkina Faso
XUA-XUZ	Cambodia (Kingdom of)
XVA-XVZ	Viet Nam (Socialist Republic of)
XWA-XWZ	Lao People's Democratic Republic
XXA-XXZ	China (People's Republic of) - Macao (WRC-07)

Call Sign Series	*Allocated to*
XYA-XZZ	Myanmar (Union of)
YAA-YAZ	Afghanistan (Islamic State of)
YBA-YHZ	Indonesia (Republic of)
YIA-YIZ	Iraq (Republic of)
YJA-YJZ	Vanuatu (Republic of)
YKA-YKZ	Syrian Arab Republic
YLA-YLZ	Latvia (Republic of)
YMA-YMZ	Turkey
YNA-YNZ	Nicaragua
YOA-YRZ	Romania
YSA-YSZ	El Salvador (Republic of)
YTA-YUZ	Serbia (Republic of) (WRC-07)
YVA-YYZ	Venezuela (Republic of)
Y2A-Y9Z	Germany (Federal Republic of)
ZAA-ZAZ	Albania (Republic of)
ZBA-ZJZ	United Kingdom of Great Britain and Northern Ireland
ZKA-ZMZ	New Zealand
ZNA-ZOZ	United Kingdom of Great Britain and Northern Ireland
ZPA-ZPZ	Paraguay (Republic of)
ZQA-ZQZ	United Kingdom of Great Britain and Northern Ireland
ZRA-ZUZ	South Africa (Republic of)
ZVA-ZZZ	Brazil (Federative Republic of)
Z2A-Z2Z	Zimbabwe (Republic of)
Z3A-Z3Z	The Former Yugoslav Republic of Macedonia
2AA-2ZZ	United Kingdom of Great Britain and Northern Ireland
3AA-3AZ	Monaco (Principality of)
3BA-3BZ	Mauritius (Republic of)
3CA-3CZ	Equatorial Guinea (Republic of)
3DA-3DM	Swaziland (Kingdom of)
3DN-3DZ	Fiji (Republic of)
3EA-3FZ	Panama (Republic of)
3GA-3GZ	Chile
3HA-3UZ	China (People's Republic of)
3VA-3VZ	Tunisia
3WA-3WZ	Viet Nam (Socialist Republic of)
3XA-3XZ	Guinea (Republic of)
3YA-3YZ	Norway
3ZA-3ZZ	Poland (Republic of)
4AA-4CZ	Mexico
4DA-4IZ	Philippines (Republic of the)
4JA-4KZ	Azerbaijani Republic
4LA-4LZ	Georgia (Republic of)
4MA-4MZ	Venezuela (Republic of)
4OA-4OZ	Montenegro (Republic of) (WRC-07)
4PA-4SZ	Sri Lanka (Democratic Socialist Republic of)
4TA-4TZ	Peru
* 4UA-4UZ	United Nations
4VA-4VZ	Haiti (Republic of)
4WA-4WZ	Democratic Republic of Timor-Leste (WRC-03)
4XA-4XZ	Israel (State of)
* 4YA-4YZ	International Civil Aviation Organization
4ZA-4ZZ	Israel (State of)
5AA-5AZ	Libya (Socialist People's Libyan Arab Jamahiriya)
5BA-5BZ	Cyprus (Republic of)
5CA-5GZ	Morocco (Kingdom of)
5HA-5IZ	Tanzania (United Republic of)
5JA-5KZ	Colombia (Republic of)
5LA-5MZ	Liberia (Republic of)
5NA-5OZ	Nigeria (Federal Republic of)
5PA-5QZ	Denmark
5RA-5SZ	Madagascar (Republic of)
5TA-5TZ	Mauritania (Islamic Republic of)
5UA-5UZ	Niger (Republic of the)
5VA-5VZ	Togolese Republic
5WA-5WZ	Samoa (Independent State of)
5XA-5XZ	Uganda (Republic of)
5YA-5ZZ	Kenya (Republic of)
6AA-6BZ	Egypt (Arab Republic of)
6CA-6CZ	Syrian Arab Republic
6DA-6JZ	Mexico
6KA-6NZ	Korea (Republic of)
6OA-6OZ	Somali Democratic Republic
6PA-6SZ	Pakistan (Islamic Republic of)
6TA-6UZ	Sudan (Republic of the)
6VA-6WZ	Senegal (Republic of)
6XA-6XZ	Madagascar (Republic of)
6YA-6YZ	Jamaica
6ZA-6ZZ	Liberia (Republic of)
7AA-7IZ	Indonesia (Republic of)
7JA-7NZ	Japan
7OA-7OZ	Yemen (Republic of)
7PA-7PZ	Lesotho (Kingdom of)
7QA-7QZ	Malawi
7RA-7RZ	Algeria (People's Democratic Republic of)
7SA-7SZ	Sweden
7TA-7YZ	Algeria (People's Democratic Republic of)
7ZA-7ZZ	Saudi Arabia (Kingdom of)
8AA-8IZ	Indonesia (Republic of)
8JA-8NZ	Japan
8OA-8OZ	Botswana (Republic of)
8PA-8PZ	Barbados
8QA-8QZ	Maldives (Republic of)
8RA-8RZ	Guyana
8SA-8SZ	Sweden
8TA-8YZ	India (Republic of)
8ZA-8ZZ	Saudi Arabia (Kingdom of)
9AA-9AZ	Croatia (Republic of)
9BA-9DZ	Iran (Islamic Republic of)
9EA-9FZ	Ethiopia (Federal Democratic Republic of)
9GA-9GZ	Ghana
9HA-9HZ	Malta
9IA-9JZ	Zambia (Republic of)
9KA-9KZ	Kuwait (State of)
9LA-9LZ	Sierra Leone
9MA-9MZ	Malaysia
9NA-9NZ	Nepal
9OA-9TZ	Democratic Republic of the Congo
9UA-9UZ	Burundi (Republic of)
9VA-9VZ	Singapore (Republic of)
9WA-9WZ	Malaysia
9XA-9XZ	Rwandese Republic
9YA-9ZZ	Trinidad and Tobago

THE PHONETIC ALPHABET

The Phonetic Alphabet should be used with considerable discretion. Its primary purpose is to obviate confusion between letters and figures which have similar sounds, e.g.: BCDEGPTV, AKJ, MN, QU, FS, TWO, THREE, FIVE, NINE.

The possibility of confusion increases greatly under adverse operating conditions such as adjacent channel interference, high level of acoustic and electrical background noise, poor audio quality (including inferior articulation), fading, etc. Under these conditions more frequent use of the phonetic code may be necessary. However, when there is a complete absence of interference of any kind and signals are perfectly readable, phonetics can be eliminated except for difficult place names, proper names, and unusual words. Regardless of the quality of the circuit phonetics should always be used for call-signs during the establishment of initial contact. It is important to memorize the code thoroughly and to avoid using substitute words.

Phonetic Alphabet

Some words are likely to be misunderstood when passed over radio telephone circuits, due to phonetic similarity. A number of phonetic alphabets have been introduced to overcome this. The following being the most generally accepted at the present time.

A	ALFA	AL fah
B	BRAVO	BRAH voh
C	CHARLIE	CHAR lee
D	DELTA	DELL tah
E	ECHO	ECK oh
F	FOXTROT	FOKS trot
G	GOLF	GOLF
H	HOTEL	hoh TELL
I	INDIA	IN dee ah
J	JULIET	JEW lee ETT
K	KILO	KEY loh
L	LIMA	LEE mah
M	MIKE	MIKE
N	NOVEMBER	no VEM ber
O	OSCAR	OSS cah
P	PAPA	pah PAH
Q	QUEBEC	Kwee BECK or Key BECK
R	ROMEO	ROW me oh
S	SIERRA	See AIR rah
T	TANGO	TANG go
U	UNIFORM	YOU nee form or OO nee form
V	VICTOR	VIK tor
W	WHISKEY	WISS key
X	X-RAY	ECKS ray
Y	YANKEE	YANG kee
Z	ZULU	ZOO loo

1 WUN	2 TOO	3 thuh-REE	4 FO-wer	5 FI-yiv
6 SIX	7 seVEN	8 AIT	9 NI-ner	0 ZERO

DX CENTURY CLUB COUNTRIES LIST

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Amateur Data Interchange Format (ADIF) Codes Reproduced Courtesy www.adif.org Version 2

Notes	Prefix	Entity	Continent	ITU	CQ	ADIF Codes
1		Sov. Mil. Order of Malta	EU	28	15	246
1		Spratly Is.	AS	50	26	247
F	3A	Monaco	EU	27	14	260
	3B6, 7	Agalega & St. Brandon Is.	AF	53	39	4
F	3B8	Mauritius	AF	53	39	444
	3B9	Rodriguez I.	AF	53	39	204
	3C	Equatorial Guinea	AF	47	36	49
	3C0	Annobon I.	AF	52	36	195
F	3D2	Fiji	OC	56	32	176
F	3D2	Conway Reef	OC	56	32	489
F	3D2	Rotuma I.	OC	56	32	275
T	3DA	Swaziland	AF	57	38	468
F	3V	Tunisia	AF	37	33	474
	3W, XV	Vietnam	AS	49	26	293
	3X	Guinea	AF	46	35	107
F	3Y	Bouvet	AF	67	38	24
F	3Y	Peter I I.	AN	72	12	136
	4J, 4K	Azerbaijan	AS	29	21	18
F	4L	Georgia	AS	29	21	75
F,47	4O	Montenegro	EU	28	15	514
F	4S	Sri Lanka	AS	41	22	315
F,T	4U_ITU	ITU HQ	EU	28	14	248
F	4U_UN	United Nations HQ	NA	08	05	289
44	4W	Timor-Leste	OC	54	28	511
F,T	4X, 4Z	Israel	AS	39	20	336
	5A	Libya	AF	38	34	2
F	5B,C4,P3	Cyprus	AS	39	20	215
F	5H-5I	Tanzania	AF	53	37	470
F	5N	Nigeria	AF	46	35	450
	5R	Madagascar	AF	53	39	438
2	5T	Mauritania	AF	46	35	444
3	5U	Niger	AF	46	35	187
	5V	Togo	AF	46	35	483
F	5W	Samoa	OC	62	32	190
F	5X	Uganda	AF	48	37	286
F	5Y-5Z	Kenya	AF	48	37	430
F,4	6V-6W	Senegal	AF	46	35	456
F,T	6Y	Jamaica	NA	11	08	82
5	7O	Yemen	AS	39	21,37	492
F	7P	Lesotho	AF	57	38	432
	7Q	Malawi	AF	53	37	440
F	7T-7Y	Algeria	AF	37	33	400
F	8P	Barbados	NA	11	08	62
	8Q	Maldives	AS/AF	41	22	159
F,T	8R	Guyana	SA	12	09	129
F,6	9A	Croatia	EU	28	15	497
F,T,7	9G	Ghana	AF	46	35	424
F	9H	Malta	EU	28	15	257
F	9I-9J	Zambia	AF	53	36	482
F	9K	Kuwait	AS	39	21	348
T	9L	Sierra Leone	AF	46	35	458
F,8	9M2, 4	West Malaysia	AS	54	28	299
F,8	9M6, 8	East Malaysia	OC	54	28	46
	9N	Nepal	AS	42	22	369
F	9Q-9T	Dem Rep. of Congo	AF	52	36	243
9	9U	Burundi	AF	52	36	404
F,10	9V	Singapore	AS	54	28	381
9	9X	Rwanda	AF	52	36	454
T,F	9Y-9Z	Trinidad & Tobago	SA	11	09	90
F	A2	Botswana	AF	57	38	402
	A3	Tonga	OC	62	32	160
F	A4	Oman	AS	39	21	370
	A5	Bhutan	AS	41	22	306
	A6	United Arab Emirates	AS	39	21	391
F	A7	Qatar	AS	39	21	376
F	A9	Bahrain	AS	39	21	304
F	AP	Pakistan	AS	41	21	372
11	BS7	Scarborough Reef	AS	50	27	506
F	BV	Taiwan	AS	44	24	386
12	BV9P	Pratas I.	AS	44	24	200
F	B	China	AS	(A)	23,24	318
	C2	Nauru	OC	65	31	157
F	C3	Andorra	EU	27	14	203
T	C5	The Gambia	AF	46	35	422
	C6	Bahamas	NA	11	08	60
F	C8-9	Mozambique	AF	53	37	181
F,T	CA-CE	Chile	SA	14,16	12	112
F,T	CE0Y	Easter I.	SA	63	12	46
F,T	CE0Z	Juan Fernandez Is.	SA	14	12	125
F,T	CE0X	San Felix & San Ambrosio	SA	14	12	217
F,S	CE9/KC4	Antarctica	AN	(B)	(C)	13
F,T	CM, CO	Cuba	NA	11	08	41
	CN	Morocco	AF	37	33	446
F,T	CP	Bolivia	SA	12,14	10	104
F	CT	Portugal	EU	37	14	272
F	CT3	Madeira Is.	AF	36	33	256
F	CU	Azores	EU	36	14	149
F,T	CV-CX	Uruguay	SA	14	13	144
F	CY0	Sable I.	NA	09	05	210
F	CY9	St. Paul I.	NA	09	05	516
	D2-3	Angola	AF	52	36	401
F	D4	Cape Verde	AF	46	35	409
F,T,13	D6	Comoros	AF	53	39	411
F,14	DA-DR	Fed. Rep. of Germany	EU	28	14	230
F,T	DU-DZ	Philippines	OC	50	27	375
15	E3	Eritrea	AF	48	37	51
43	E4	Palestine	AS	39	20	510
	E5	N. Cook Is.	OC	62	32	191
	E5	S. Cook Is.	OC	62	32	234
F,T,29	E7	Bosnia-Herzegovina	EU	28	15	501
F	EA-EH	Spain	EU	37	14	281
F	EA6-EH6	Balearic Is.	EU	37	14	21
F	EA8-EH8	Canary Is.	AF	36	33	29
F	EA9-EH9	Ceuta & Melilla	AF	37	33	32
F	EI-EJ	Ireland	EU	27	14	245
F	EK	Armenia	AS	29	21	14
F,T	EL	Liberia	AF	46	35	434
F	EP-EQ	Iran	AS	40	21	330
F	ER	Moldova	EU	29	16	179
F	ES	Estonia	EU	29	15	52
F	ET	Ethiopia	AF	48	37	53
F	EU- EW	Belarus	EU	29	16	27
F	EX	Kyrgyzstan	AS	30,31	17	135
F	EY	Tajikistan	AS	30	17	262

Notes	Prefix	Entity	Continent	ITU	CQ	ADIF Codes
F	EZ	Turkmenistan	AS	30	17	280
F	F	France	EU	27	14	227
F	FG	Guadeloupe	NA	11	08	79
F,13	FH	Mayotte	AF	53	39	169
F,49	FJ	Saint Barthelemy	NA	11	08	211
F	FK	New Caledonia	OC	56	32	162
45	FK	Chesterfield Is.	OC	56	30	512
F	FM	Martinique	NA	11	08	84
F,16	FO	Austral I.	OC	63	32	16
F,16	FO	Marquesas I.	OC	63	31	167
F	FO	Clipperton I.	NA	10	07	35
F	FO	French Polynesia	OC	63	32	175
F	FP	St. Pierre & Miquelon	NA	09	05	253
F,17	FR/G	Glorioso Is.	AF	53	39	99
F,17	FR/J, E	Juan de Nova, Europa	AF	53	39	124
F	FR	Reunion I.	AF	53	39	453
F	FR/T	Tromelin I.	AF	53	39	276
F,1	FJ	Saint Martin	NA	11	08	211
F	FT/W	Crozet I.	AF	68	39	41
F	FT/X	Kerguelen Is.	AF	68	39	131
F	FT/Z	Amsterdam & St. Paul Is.	AF	68	39	10
F	FW	Wallis & Futuna Is.	OC	62	32	298
F	FY	French Guiana	SA	12	09	63
F	G, GX, M	England	EU	27	14	223
F	GD, GT, MD	Isle of Man	EU	27	14	114
F	GI, GN, MI	Northern Ireland	EU	27	14	265
F	GJ, GH, MJ	Jersey	EU	27	14	122
F	GM, GS, MM	Scotland	EU	27	14	279
F	GU, GPm MU	Guernsey	EU	27	14	106
F	GW, GC, MW	Wales	EU	27	14	294
F	H4	Solomon Is.	OC	51	28	499
F,18	H40	Temotu Province	OC	51	32	507
F	HA, HG	Hungary	EU	28	15	239
F	HB	Switzerland	EU	28	14	287
F	HB0	Liechtenstein	EU	28	14	251
F,T	HC-HD	Ecuador	SA	12	10	120
F,T	HC8-HD8	Galapagos Is.	SA	12	10	71
T	HH	Haiti	NA	11	08	78
F,T	HI	Dominican Republic	NA	11	08	72
F,T	HJ-HK, 5J-5K	Colombia	SA	12	09	116
F,T	HK0	Malpelo I.	SA	12	09	442
F,T	HK0	San Andres & Providencia	NA	11	07	216
F	HL, 6K-6N	South Korea	AS	44	25	235
F,T	HO-HP	Panama	NA	11	07	88
F,T	HQ-HR	Honduras	NA	11	07	80
F	HS-E2	Thailand	AS	49	26	387
	HV	Vatican	EU	28	15	295
F	HZ	Saudi Arabia	AS	39	21	378
F	I	Italy	EU	28	15, 33	248
F	IS0, IM0	Sardinia	EU	28	15	225
F	J2	Djibouti	AF	48	37	382
F,T	J3	Grenada	NA	11	08	77
	J5	Guinea-Bissau	AF	46	35	109
F,T	J6	St. Lucia	NA	11	08	516
F,T	J7	Dominica	NA	11	08	95
T	J8	St. Vincent	NA	11	08	253
F	JA-JS, 7J-7N	Japan	AS	45	25	339
F,19	JD1	Minami Torishima	OC	90	27	177
F,20	JD1	Ogasawara	AS	45	27	192
F	JT-JV	Mongolia	AS	32, 33	23	363
F	JW	Svalbard	EU	18	40	140
F	JX	Jan Mayen	EU	18	40	118
F,T	JY	Jordan	AS	39	20	342

Notes	Prefix	Entity	Continent	ITU	CQ	ADIF Codes
T	K, W, N, AA-AK	United States of America	NA	6,7,8	3,4,5	291
F,T	KG4	Guantanamo Bay	NA	11	08	105
T	KH0	Mariana Is.	OC	64	27	166
T	KH1	Baker & Howland Is.	OC	61	31	19
F,T	KH2	Guam	OC	64	27	103
F,T	KH3	Johnston I.	OC	61	31	122
T	KH4	Midway I.	OC	61	31	173
T	KH5	Palmyra & Jarvis Is.	OC	61,62	31	197
T	KH5K	Kingman Reef	OC	61	31	134
F,T	KH6, KH7	Hawaii	OC	61	31	110
T	KH7K	Kure I.	OC	61	31	134
F,T	KH8	American Samoa	OC	62	32	9
F,T48	KH8	Swains I.	OC	62	32	259
T	KH9	Wake I.	OC	65	31	301
F,T	KL, AL, NL, WL	Alaska	NA	1,2	1	6
T	KP1	Navassa I.	NA	11	08	157
F,T	KP2	Virgin Is.	NA	11	08	293
F,T	KP4, KP3	Puerto Rico	NA	11	08	202
T,22	KP5	Desecheo I.	NA	11	08	221
F	LA-LN	Norway	EU	18	14	266
F,T	LO-LW	Argentina	SA	14,16	13	100
F	LX	Luxembourg	EU	27	14	254
F	LY	Lithuania	EU	29	15	146
F	LZ	Bulgaria	EU	28	20	212
F,T	OA-OC	Peru	SA	12	10	136
F	OD	Lebanon	AS	39	20	354
F,T	OE	Austria	EU	28	15	206
F	OF-OI	Finland	EU	18	15	224
F	OH0	Aland Is.	EU	18	15	5
F	OJ0	Market Reef	EU	18	15	167
F,23	OK-OL	Czech Rep.	EU	28	15	215
F,23	OM	Slovak Rep.	EU	28	15	255
F	ON-OT	Belgium	EU	27	14	209
F	OU-OW, OZ	Denmark	EU	18	14	221
F	OX	Greenland	NA	5, 75	40	237
F	OY	Faroe Is.	EU	18	14	222
24	P2	Papua New Guinea	OC	51	28	163
F,25	P4	Aruba	SA	11	09	91
26	P5	Democratic People's Republic of Korea	AS	44	25	344
F	PA-PI	Netherlands	EU	27	14	263
F	PJ2, 4, 9	Bonaire, Curacao	SA	11	09	104
F	PJ5-8	St. Maarten, Saba, St Eustatius	NA	11	08	516
F,T	PP-PY	Brazil	SA	(D)	11	108
F,T	PP0-PY0	Fernando de Noronha	SA	13	11	56
F,T	PP0-PY0	St. Peter & St. Paul Rocks	SA	13	11	253
F,T	PP0-PY0	Trindade & Martin Vaz Is.	SA	15	11	271
	PZ	Suriname	SA	12	09	140
F	R1FJ	Franz Josef Land	EU	75	40	61
F	R1MV	Malyj Vysotskij I	EU	29	16	151
1,27	S0	Western Sahara	AF	46	33	302
F	S2	Bangladesh	AS	41	22	305
F,6	S5	Slovenia	EU	28	15	499
	S7	Seychelles	AF	53	39	379
F	S9	Sao Tome & Principe	AF	47	36	219
F	SA-SM	Sweden	EU	18	14	284
F	SN-SR	Poland	EU	28	15	269
	ST	Sudan	AF	47, 48	34	466
	SU	Egypt	AF	38	34	478
F,4	SV-SZ	Greece	EU	28	20	236

Notes	Prefix	Entity	Continent	ITU	CQ	ADIF Codes
F	SV/A	Mount Athos	EU	28	20	446
F,45	SV5	Dodecanese	EU	28	20	45
F,49	SV9	Crete	EU	28	20	40
28	T2	Tuvalu	OC	65	31	282
	T30	W. Kiribati (Gilbert Is.)	OC	65	31	301
	T31	C. Kiribati (Brit. Phoenix Is.)	OC	62	31	31
	T32	E. Kiribati (Line Is.)	OC	61,63	31	513
	T33	Banaba I. (Ocean I.)	OC	65	31	21
	T5, 60	Somalia	AF	48	37	232
F	T7	San Marino	EU	28	15	278
21	T8	Palau	OC	64	27	22
F	TA-TC	Turkey	EU/AS	39	20	390
F	TF	Iceland	EU	17	40	242
F,T	TG, TD	Guatemala	NA	12	07	76
F,T	TI, TE	Costa Rica	NA	11	07	308
F,T	TI9	Cocos I.	NA	12	07	36
	TJ	Cameroon	AF	47	36	406
F	TK	Corsica	EU	28	15	214
30	TL	Central Africa	AF	47	36	30
31	TN	Congo (Republic of)	AF	52	36	39
F,32	TR	Gabon	AF	52	36	420
33	TT	Chad	AF	47	36	410
F,34	TU	Côte d'Ivoire	AF	46	35	428
35	TY	Benin	AF	46	35	416
F,36	TZ	Mali	AF	46	35	442
F	UA-UI	1, 3, 4, 6 RA-RZ European Russia	EU	(E)	16	54
F	UA2	Kaliningrad	EU	29	15	126
F	UA-UI	8, 9, 0 RA-RZ Asiatic Russia	AS	(F)	(G)	15
	UJ-UM	Uzbekistan	AS	30	17	292
F	UN-UQ	Kazakhstan	AS	29-31	17	130
F	UR-UZ, EM-EO	Ukraine	EU	29	16	288
F,T	V2	Antigua & Barbuda	NA	11	08	94
T	V3	Belize	NA	11	07	66
T37	V4	St. Kitts & Nevis	NA	11	08	516
F	V5	Namibia	AF	57	38	464
T,38	V6	Micronesia (E.Caroline Is.)	OC	65	27	173
F,T	V7	Marshall Is.	OC	65	31	168
F	V8	Brunei Darussalam	OC	54	28	345
F,T	VE, VO, VY	Canada	NA	(H)	1-5	1
F,T	VK	Australia	OC	(I)	29, 30	150
F,T	VK0	Heard I.	AF	68	39	110
F,T	VK0	Macquarie I.	OC	60	30	502
F,T	VK9C	Cocos (Keeling) Islands	OC	54	29	36
F,T	VK9L	Lord Howe I.	OC	60	30	146
F,T	VK9M	Mellish Reef	OC	56	30	171
F	VK9N	Norfolk I.	OC	60	32	188
F,T	VK9W	Willis I.	OC	55	30	302
F,T	VK9X	Christmas I.	OC	54	29	318
37	VP2E	Anguilla	NA	11	08	12
37	VP2M	Montserrat	NA	11	08	96
F,37	VP2V	British Virgin Is.	NA	11	08	65
F	VP5	Turks & Caicos Is.	NA	11	08	89
F,46	VP6	Ducie I.	OC	63	32	72
F,T	VP6	Pitcairn I.	OC	63	32	375
F	VP8	Falkland Is.	SA	16	13	141
F	VP8, LU	South Georgia I.	SA	73	13	232
F	VP8, LU	South Orkney Is.	SA	73	13	238
F	VP8, LU	South Sandwich Is.	SA	73	13	238
F	VP8, LU, CE9, HF0, 4K1	South Shetland Is.	SA	73	13	240
F	VP9	Bermuda	NA	11	05	64
F	VQ9	Chagos Is.	AF	41	39	33
F	VR	Hong Kong	AS	44	24	321
F	VU	India	AS	41	22	324
F	VU4	Andaman & Nicobar Is.	AS	49	26	11
F	VU7	Lakshadweep Is.	AS	41	22	135
F,T	XA-XI	Mexico	NA	10	06	50
F,T	XA4-XI4	Revillagigedo	NA	10	06	453
F,39	XT	Burkina Faso	AF	46	35	212
	XU	Cambodia	AS	49	26	312
	XW	Laos	AS	49	26	143
F	XX9	Macao	AS	44	24	152
	XY-XZ	Myanmar	AS	49	26	309
	YA	Afghanistan	AS	40	21	3
F,40	YB-YH	Indonesia	OC	51,54	28	327
F	YI	Iraq	AS	39	21	333
F	YJ	Vanuatu	OC	56	32	158
F	YK	Syria	AS	39	20	384
F	YL	Latvia	EU	29	15	145
F,T	YN, H6-7, HT	Nicaragua	NA	11	07	86
F	YO-YR	Romania	EU	28	20	275
F,T	YS, HU	El Salvador	NA	11	07	74
F	YT-YU	Serbia	EU	28	15	296
F,T	YV-YY, 4M	Venezuela	SA	12	09	148
F,T	YV0	Aves I.	NA	11	08	206
	Z2	Zimbabwe	AF	53	38	452
F,41	Z3	Macedonia (Yugoslav Rep.)	EU	28	15	502
F	ZA	Albania	EU	28	15	7
F	ZB2	Gibraltar	EU	37	14	233
F,42	ZC4	UK Sov. Base areas ON Cyprus	AS	39	20	288
F	ZD7	St. Helena	AF	66	36	516
F	ZD8	Ascension I.	AF	66	36	91
	ZD9	Tristan da Cunha & Gough I.	AF	66	38	90
F	ZF	Cayman Is.	NA	11	08	409
F	ZK2	Niue	OC	62	32	188
F	ZK3	Tokelau Is.	OC	62	31	270
F	ZL-ZM	New Zealand	OC	60	32	170
F	ZL7	Chatham Is.	OC	60	32	34
F	ZL8	Kermadec Is.	OC	60	32	133
F	ZL9	Auckland & Campbell Is.	OC	60	32	16
F,T	ZP	Paraguay	SA	14	11	132
F,T	ZR-ZU	South Africa	AF	57	38	232
F	ZS8	Prince Edward & Marion Is.	AF	57	38	201

NOTES

1 Unofficial prefix.

2 (5T) Only contacts made June 20, 1960, and after, count for this entity.

3 (5U) Only contact made August 3, 1960, and after, count for this entity.

4 (6W) Only contacts made June 20, 1960, and after, count for this entity.

5 (7O) Only contacts made May 22, 1990, and after, count for this entity.

6 (9A, S5) Only contacts made June 26, 1991, and after, count for this entity.

7 (9G) Only contacts made March 5, 1957, and after, count for this entity.

8 (9M2, 4, 6, 8) Only contacts made September 16, 1963, and after, count for this entity.

9 (9U, 9X) Only contacts made July 1, 1962, and after, count for this entity.

10 (9V) Contacts made from September 16, 1963 to August 8, 1965, count for West Malaysia.

11 (BS7) Only contacts made January 1, 1995, and after, count for this entity.

12 (BV9P) Only contacts made January 1, 1994, and after, count for this entity.

13 (D6, FH8) Only contacts made July 6, 1975, and after, count for this entity.

14 (DA-DR) Only contacts made with DA-DR stations September 17, 1973, and after, and contacts made with Y2-Y9 stations October 3, 1990 and after, count for this entity.

15 (E3) Only contacts made November 14, 1962, and before, or May 24, 1991,

and after, count for this entity.

16 (FO) Only contacts made after 23:59 UTC, March 31, 1998 count for this entity.

17 (FR) Only contacts made June 25, 1960, and after, count for this entity.

18 (H40) Only contacts made after 23:59 UTC, March 31, 1998 count for this entity.

19 (JD) Formerly Marcus Island.

20 (JD) Formerly Bonin and Volcano Islands.

21 (KC6) Includes Yap Islands December 31, 1980, and before.

22 (KP5, KP4) Only contacts made March 1, 1979, and after, count for this entity.

23 (OK-OL, OM) Only contacts made January 1, 1993, and after, count for this entity.

24 (P2) Only contacts made September 16, 1975, and after, count for this entity.

25 (P4) Only contacts made January 1, 1986, and after, count for this entity.

26 (P5) Only contacts made May 14, 1995, and after count for this entity.

27 (S0) Contacts with Rio de Oro (Spanish Sahara), EA9, also count for this entity.

28 (T2) Only contacts made January 1, 1976, and after, count for this entity.

29 (E7) New prefix for Bosnia - Herzegovina effective November 17, 2007. Contacts are valid for this entity effective October 15, 1991.

30 (TL) Only contacts made August 13, 1960, and after, count for this entity.

31 (TN) Only contacts made August 15, 1960, and after, count for this entity.

32 (TR) Only contacts made August 17, 1960, and after, count for this entity.

33 (TT) Only contacts made August 11, 1960, and after count for this entity.

34 (TU) Only contacts made August 7, 1960, and after, count for this entity.

35 (TY) Only contacts made August 1, 1960, and after, count for this entity.

36 (TZ) Only contacts made June 20, 1960, and after, count for this entity.

37 (V4, VP2) For DXCC credit for contacts made May 31, 1958 and before: "In view of the recent Federation of British Territories in the Caribbean, and the desire to update the Countries List and bring it into line with the published criteria, the following changes to the ARRL Countries List are herewith announced. These changes will be effective as of June 1, 1958." From June 1958 QST page 97

38 (V6) Includes Yap Islands January 1, 1981, and after.

39 (XT) Only contacts made August 5, 1960, and after, count for this entity.

40 (YB) Only contacts made May 1, 1963, and after, count for this entity.

41 (Z3) Only contacts made September 8, 1991, and after, count for this entity.

42 (ZC4) Only contacts made August 16, 1960, and after, count for this entity.

43 (E4) Only contacts made February 1, 1999, and after, count for this entity.

44 (4W) Only contacts made March 1, 2000, and after, count for this entity.

45 (FK/C) Only contacts made March 23, 2000, and after, count for this entity.

46 (VP6) Only contacts made November 16, 2001, and after, count for this entity.

47 (4O) Only contacts made June 28, 2006, and after, count for this entity.

48 (KH8 - Swains I.) Only contacts made July 22, 2006, and after, count for this entity.

49 (FJ - Saint Barthelemy) Only contacts made December 14, 2007, and after, count for this entity.

"F" indicates current list of entities for which QSLs may be forwarded by the ARRL membership outgoing QSL service.

"T" indicates entities with which U.S. amateurs may legally handle third-party message traffic.

"S" Also 3Y, 8J1, AT0, DP0, FT8Y, LU, OR4, R1AN, VK0, VP8, ZL5, ZS1, ZX0, etc. QSL via entity under whose auspices the particular station is operating. The availability of a third-party traffic agreement and a QSL Bureau applies to the entity under whose auspices the particular station is operating.

DELETED ENTITIES

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Deleted Entities Total: 58

Credit for any of these entities can be given if the date of contact in question agrees with the date(s) shown in the corresponding footnote. Entities deleted after 23:59 UTC 31 March 1998 will not be included in the Deleted List.

Notes	Prefix	Entity	Continent	ITU	CQ
2		Blenheim Reef	AF	41	39
3		Geyser Reef	AF	53	39
4		Abu Ai Is.	AS	39	21
1,5	1M	Minerva Reef	OC	62	32
6	4W	Yemen Arab Rep.	AS	39	21
7	7J1	Okino Tori-shima	AS	45	27
8	8Z4	Saudi Arabia/Iraq Neut. Zone	AS	39	21
9	8Z5, 9K3	Kuwait/Saudi Arabia Neut. Zone	AS	39	21
10	9S4	Saar	EU	28	14
11	9U5	Ruanda-Urundi	AF	52	36
1,12	AC3	Sikkim	AS	41	22
1,13	AC4	Tibet	AS	41	23
14	C9	Manchuria	AS	33	24
15	CN2	Tangier	AF	37	33
16	CR8	Damao, Diu	AS	41	22
16	CR8	Goa	AS	41	22
17	CR8, CR10	Portuguese Timor	OC	54	28
18	DA-DM	Germany	EU	28	14
19	DM, Y2-9	German Dem. Rep.	EU	28	14
20	EA9	Ifni	AF	37	33
21	FF	French West Africa	AF	46	35
22	FH, FB8	Comoros	AF	53	39
23	FI8	French Indo-China	AS	49	26
24	FN8	French India	AS	41	22
25	FQ8	Fr. Equatorial Africa	AF	47, 52	36

Notes	Prefix	Entity	Continent	ITU	CQ
26	HKØ	Bajo Nuevo	NA	11	08
26	HKØ, KP3, KS4	Serrana Bank & Roncador Cay	NA	11	07
27	I1	Trieste	EU	28	15
28	I5	Italian Somaliland	AF	48	37
29	JZØ	Netherlands N. Guinea	OC	51	28
30	KR6, 8, JR6, KA6	Okinawa (Ryukyu Is.)	AS	45	25
31	KS4	Swan Is.	NA	11	07
32	KZ5	Canal Zone	NA	11	07
33	OK-OM	Czechoslovakia	EU	28	15
34	P2, VK9	Papua Territory	OC	51	28
34	P2, VK9	Terr. New Guinea	OC	51	28
35	PK1-3	Java	OC	54	28
35	PK4	Sumatra	OC	54	28
35	PK5	Netherlands Borneo	OC	54	28
35	PK6	Celebe & Molucca Is.	OC	54	28
36	STØ	Southern Sudan	AF	47,48	34
37	UN1	Karelo-Finnish Rep.	EU	19	16
38	VO	Newfoundland, Labrador	NA	09	02, 05
39	VQ1, 5H1	Zanzibar	AF	53	37
40	VQ6	British Somaliland	AF	48	37
41	VQ9	Aldabra	AF	53	39
41	VQ9	Desroches	AF	53	39
41	VQ9	Farquhar	AF	53	39

42	VS2, 9M2	Malaya	AS	54	28
42	VS4	Sarawak	OC	54	28
43	VS9A, P, S	People's Dem. Rep. of Yemen	AS	39	21
44	VS9H	Kuria Muria I.	AS	39	21
45	VS9K	Kamaran Is.	AS	39	21
42	ZC5	British North Borneo	OC	54	28
46	ZC6, 4X1	Palestine	AS	39	20
47	ZD4	Gold Coast, Togoland	AF	46	35
48	ZSØ, 1	Penguin Is.	AF	57	38
49	ZS9	Walvis Bay	AF	57	38

NOTES

1 Unofficial prefix.

2 (Blenheim Reef) Only contacts made from May 4, 1967, to June 30, 1975, count for this entity. Contacts made July 1, 1975, and after, count as Chagos (VQ9).

3 (Geyser Reef) Only contacts made from May 4, 1967, to February 28, 1978, count for this entity.

4 (Abu Ail Is.) Only contacts made March 30, 1991, and before, count for this entity.

5 (1M) Only contacts made from July 15, 1972, and before, count for this entity. Contacts made July 16, 1972, and after, count as Tonga (A3).

6 (4W) Only contacts made May 21, 1990, and before, count for this entity.

7 (7J1) Only contacts made May 30, 1976, to November 30, 1980, count for this entity. Contacts made December 1, 1980, and after, count as Ogasawara (JD1).

8 (8Z4) Only contacts made December 25, 1981, and before, count for this entity.

9 (8Z5, 9K3) Only contacts made December 14, 1969, and before, count for this entity.

10 (9S4) Only contacts made 31 March 1957, and before, count for this entity.

11 (9U5) Only contacts made from July 1, 1960, to June 30, 1962, count for this entity. Contacts made July 1, 1962, and after, count as Burundi (9U) or Rwanda (9X).

12 (AC3) Only contacts made April 30, 1975, and before, count for this entity. Contacts made May 1, 1975, and after, count as India (VU).

13 (AC4) Only contacts made May 30, 1974, and before, count for this entity. Contacts made May 31, 1974 and after, count as China (BY).

14 (C9) Only contacts made September 15, 1963, and before, count for this entity. Contacts made September 14, 1963, and after, count as China (BY).

15 (CN2) Only contacts made June 30, 1960, and before, count for this entity. Contacts made July 1, 1960, and after, count as Morocco (CN).

16 (CR8) Only contacts made December 31, 1961, and before, count for this entity.

17 (CR8, CR10) Only contacts made September 14, 1976, and before, count for this entity.

18 (DA-DM) Only contacts made September 16, 1973, and before, count for this entity. Contacts made September 17, 1973, and after, count as either FRG (DA-DL) or GDR(Y2-Y9).

19 (DM, Y2-Y9) Only contacts made from September 17, 1973 and October 2, 1990 count for this entity. On October 3, 1990 the GDR became part of the FRG.

20 (EA9) Only contacts made May 13, 1969, and before, count for this entity.

21 (FF) Only contacts made August 6, 1960, and before, count for this entity.

22 (FH, FB8) Only contacts made July 5, 1975, and before, count for this entity. Contacts made July 6, 1975, and after, count as Comoros (D6) or Mayotte (FH).

23 (FI8) Only contacts made December 20, 1950, and before, count for this entity.

24 (FN8) Only contacts made October 31, 1954, and before count for this entity.

25 (FQ8) Only contacts made August 16, 1960, and before, will count for this entity.

26 (HK0 , KP3, KS4) Only contacts made September 16, 1981, and before, count for this entity. Contacts made September 17, 1981, and after, count as San Andres (HK0).

27 (I1) Only contacts made March 31, 1957, and before, count for this entity. Contacts made April 1, 1957, and after, count as Italy (I).

28 (I5) Only contacts made June 30, 1960, and before, count for this entity.

29 (JZ0) Only contacts made April 30, 1963, and before, count for this entity.

30 (KR6, 8, JR6, KA6) Only contacts made May 14, 1972, and before, count for this entity. Contacts made May 15, 1972, and after, count as Japan (JA).

31 (KS4) Only contacts made August 31, 1972, and before, count for this entity. Contacts made September 1, 1972, and after, count as Honduras (HR).

32 (KZ5) Only contacts made September 30, 1979, and before, count for this entity.

33 (OK-OM) Only contacts made December 31, 1992, and before, count for this entity.

34 (P2, VK9) Only contacts made September 15, 1975, and before, count for this entity. Contacts made September 16, 1975, and after, count as Papua New Guinea (P2).

35 (PK1-6) Only contacts made April 30, 1963, and before, count for this entity. Contacts made May 1, 1963, and after, count as Indonesia.

36 (ST0) Only contacts made between May 7, 1972 and December 31, 1994 count for this entity.

37 (UN1) Only contacts made June 30, 1960, and before, count for this entity. Contacts made July 1, 1960, and after, count as European RSFSR (UA).

38 (VO) Only contacts made March 31, 1949, and before, count for this entity. Contacts made April 1, 1949, and after, count as Canada (VE).

39 (VQ1, 5H1) Only contacts made May 31, 1974, and before, count for this entity. Contacts made June 1, 1974, and after, count as Tanzania (5H).

40 (VQ6) Only contacts made June 30, 1960, and before, count for this entity.

41 (VQ9) Only contacts made June 28, 1976, and before, count for this entity. Contacts made June 29, 1976, and after, count as Seychelles (S7).

42 (VS2, VS4, ZC5, 9M2) Only contacts made September 15, 1963, and before, count for this entity. Contacts made September 16, 1963, and after, count as West Malaysia (9M2) or East Malaysia (9M6, 8).

43 (VS9A, P,S) Only contacts made May 21, 1990, and before, count for this entity.

44 (VS9H) Only contacts made November 29, 1967, and before, count for this entity.

45 (VS9K) Only contacts made on March 10, 1982, and before, count for this entity.

46 (ZC6, 4X1) Only contacts made June 30, 1968, and before, count for this entity. Contacts made July 1, 1968, and after, count as Israel (4X).

47 (ZD4) Only contacts made March 5, 1957, and before, count for this entity.

48 (ZS0, 1) Only contacts made February 28, 1994, and before, count for this entity.

49 (ZS9) Only contacts made from September 1, 1977, to February 28, 1994, count for this entity.

PREFIX CROSS REFERENCES

Reproduced courtesy ARRL, revised June 2008

Continent

AF = Africa
AN = Antarctica
AS = Asia
EU = Europe
NA = North America
OC = Oceania
SA = South America

Zone Notes

(A) 33, 42, 43, 44
(B) 67, 69-74
(C) 12, 13, 29, 30, 32, 38, 39
(D) 12, 13, 15
(E) 19, 20, 29, 30
(F) 20-26, 30-35, 75
(G) 16, 17, 18, 19, 23
(H) 2, 3, 4, 9, 75
(I) 55, 58, 59

A8 = EL
AC (before 1972) = A5
AH = KH
AL7 = KL7
AM-AO = EA
AT-AW = VU
AX = VK
AY-AZ = LU
CF-CK = VE
CL = CO
CQ-CS = CT
CR3 (before 1974) = J5
CR4 (before 1976) = D4
CR5 (before 1976) = S9
CR6 (before 1976) = D2
CR7 (before 1976) = C9
CR9 (before 1985) = XX9
CT2 (before 1986) = CU
CX0 = CE9/VP8
CY-CZ = VE
CY0 (before 1985) = CY9
D7 = HL
DM-DT (before 1980) = Y2-9
DS-DT = HL
E2 = HS
EA0 (before 1969) = 3C
EK, EM-EO, ER-ES, EU-EZ = U
ER (after 1992) = UO
EU (after 1991) = UC
FA-FF (after 1983) = F
FA(before 1963) = 7X
FB8 (before 1961) = 5R
FB8 (before 1985) = FT
FC(before 1985) = TK
FD8 (before 1961) = 5V
FE8 (before 1961) = TJ
FL(before 1978) = J2
FU8 (before 1982) = YJ
GB = G
GC(before 1977) = GJ or GU
H2 = 5B
H3 = HP
H5 (Bophutatswana) = ZS
H7 = YN

HE = HB
HM (before 1982) = HL
HT = YN
HU = YS
HW-HY = F
J4 = SV
KA1 = JD1
KA2AA-KA9ZZ = JA
KB6 (before 1979) = KH1
KC4 (Navassa) = KP1
KC6 (before 1990) = V6
KC6 (before 1998) = T8
KG6 (before 1979) = KH2
KG6I (before 1970) = JD1
KG6R, S, T (before 1979) = KH0
KH7 (before 1996) = KH7K
KJ6 (before 1979) = KH3
KM6 (before 1979) = KH4
KP4 (Desecheo) = KP5
KP6 (before 1979) = KH5
KS6 (before 1979) = KH8
KV4 (before 1979) = KP2
KW6 (before 1979) = KH9
KX6 (before 1990) = V7
L2-9 = LU
M = G
M1 (before 1984) = T7
MP4B (before 1972) = A9
MP4M (before 1972) = A4
MP4Q (before 1972) = A7
MP4T, D (before 1972) = A6
NH = KH
NL7 = KL7
NP = KP
OQ (before 1961) = 9Q
P3 = 5B
P4 (before 1986) = PJ
PX (before 1970) = C3
RA, RN = UA
RB-RR = UB-UR
RS = U
RT = UB
RU-RX = U
S4 (Ciskei) = ZS
S8 (Transkei) = ZS
T4 = CO
T4 (Venda) = ZS
T9 = E7
TH, TM, TO-TQ, TV-TX = F
UB (before 1994) = UZ
UC (before 1991) = EU
UD (before 1994) = 4J
UF (before 1994) = 4L
UG (before 1994) = EK
UH (before 1993) = EZ
UI (before 1994) = UJ
UJ (before 1993) = EY
UL (before 1994) = UN
UM (before 1993) = EX
UO (before 1994) = ER
UP (before 1991) = LY
UQ (before 1992) = YL
UR (before 1991) = ES
V9 (Venda) = ZS
VA-VG = VE
VH-VN = VK
VK9 (Nauru) = C2
VP1 (before 1982) = V3
VP2A (before 1982) = V2
VP2D (before 1979) = J7
VP2G (before 1975) = J3
VP2K (before 1984) = V4 or VP2E
VP2L (before 1980) = J6
VP2S (before 1980) = J8
VP3 (before 1967) = 8R
VP4 (before 1963) = 9Y
VP5 (Jamaica) = 6Y
VP5E = VP2E
VP6 (before 1967) = 8P
VP7 (before 1974) = C6
VQ2 (before 1965) = 9J
VQ3 (before 1962) = 5H
VQ4 (before 1964) = 5Z
VQ5 (before 1963) = 5X
VQ8 (before 1969) = 3B
VQ8 (Chagos) = VQ9
VQ9 (Seychelles) = S7
VR1 (before 1980) = T3
VR2 (before 1971) = 3D2
VR2 (after 1991) = VS6
VR3 (before 1980) = T32
VR4 (before 1979) = H4
VR5 (before 1971) = A3
VR6 (before 1998) = VP6
VR8 (before 1979) = T2
VS1 (before 1966) = 9V
VS5 (before 1985) = V8
VS6 (before 1997) = VR
VS7 (before 1949) = 4S
VS9M = 8Q
VS9O (before 1961) = A4
VX-VY = CY0/VE
WH = KH
WL7 = KL7
WP = KP
XJ-XO = VE
XP = OX
XQ-XR = CE
XS = BY
XV = 3W
XX7 (before 1976) = C9
YU2 (before 1992) = 9A
YU3 (before1992) = S5
YU4 (before 1992) = T9
YU5 (before 1992) = Z3
ZB1 (before 1965) = 9H
ZD1 (before 1962) = 9L
ZD2 (before 1961) = 5N
ZD3 (before 1966 = C5
ZD5 (before 1969) = 3DA
ZD6 (before 1965) = 7Q
ZE (before 1981) = Z2-9
ZK1 (after June 2006) = E5
ZK9 (1983) = ZK2
ZM6 (before 1963) = 5W
ZM7 (before 1984) = ZK3
ZS3 (before 1991) = V5
ZS7 (before 1969) = 3D6
ZS8 (before 1967) = 7P
ZS9 (before 1967) = A2
ZV-ZZ = PY
2D = GD
2E = G
2I = GI
2J = GJ
2M = GM
2U = GU
2W = GW
3B-3C (before 1968) = VE
3D6 (before 1988) = 3DA
3G = CE
3Z = SP
4A-4C = XE
4D-4I = DU
4J-4L = U
4J (after 1991) = EK
4J1F (before 1994) = R1MV
4K (before 1994) = UA
4K1 (before 1994) = CE9/KC4
4K2 (before 1994) = R1FJ
4K3 (before 1994) = UA
4K4 (before 1994) = UA0
4L (after 1991) = UF
4M = YV
4N-4O = YU
4T = OA
4U1VIC = OE
4V = HH
5J-5K = HK
5L-5M = EL
6C = YK
6D-6J = XE
6K-6N = HL
6O = T5
6T-6U = ST
7A-7I = YB
7G (before 1967) = 3X
7J-7N = JA
7JI = JA1 or JD1
7S = SM
7Z = HZ
8A-8I = YB
8J-8N = JA
8O = A2
8S = SM
9A (before 1984) = T7
9B-9D = EP
9E-9F = ET

AMATEUR SATELLITES

Satellite operation is a fascinating and challenging aspect of amateur radio. There are a variety of modes both digital and analog that can be used and a choice of satellites to communicate through. Equipment required for satellite operation can range from a dual band hand held transceiver with a hand held Yagi antenna, up to sophisticated ground stations with computer-controlled transceivers and antenna systems.

The amateur satellite service is recognised by the ITU. There are frequency allocations within the amateur bands for satellite operation, [see the New Zealand Amateur Radio Bandplans].

The first amateur radio satellite, was OSCAR 1 launched on the 12th December 1961 by a Thor Agena B rocket from Vandenberg Air Force Base, California. Coincidentally the date was also significant because it was the 60th anniversary of the first radio transmission across the Atlantic Ocean by Guglielmo Marconi. It is impressive that amateur radio hams were able to build a successful satellite only four years after Sputnik 1, the first ever man made satellite, which was launched on the 4th October 1957.

OSCAR 1 was the first non-governmental satellite ever launched. It transmitted "HI" in Morse code with 140 milliwatts of power on a frequency of 144.983 MHz. As a scientific experiment, the speed of the cw message was used to indicate the temperature inside the satellite.

Since 1961 there have been more than 120 satellites launched carrying transponders or beacons on amateur radio frequencies. Many of these are small 'cubesats' built by Universities or other interest groups. While these often use amateur radio frequencies for control and telemetry they are of less interest than the satellites built by ham radio enthusiasts which carry transponders for use by ham radio operators, world wide. To differentiate between these two classes of satellites, I refer to the satellites built by Universities etc. as "amateur satellites" and the satellites built by radio hams as "amateur radio satellites" or 'HAMSATS '.

There are currently 10 HAMSATS in orbit with active analog transponders and 38 with digital transponders or beacons.

Most amateur radio satellites (HAMSATS) are awarded an OSCAR number as soon as the satellite is in orbit and operational. OSCAR stands for Orbital Satellite Carrying Amateur Radio. So far there have been 68 OSCAR satellites, originating from 23 countries. OSCAR numbers are issued sequentially and the designation usually gives a clue as to the origin of the satellite. For example AO-7 is from AMSAT North America, FO-29 is Fuji OSCAR from Japan, SO-50 is from Saudi Arabia, VO-52 is from India, and UO-11 is from University of Surrey. As well as the OSCAR satellites, there was a series of 18 Russian built amateur radio satellites, which were known as Radiosputnik or "RS" satellites. Many of the RS satellites were amateur radio transponders physically attached to commercial communications satellites and were not issued with OSCAR numbers. RS-30 named "Yubileiny", Russian for jubilee was launched on May 23, 2008. The satellite celebrates the 50th anniversary of 'Sputnik' the first man made space satellite.

Amateur radio has also been an important part of manned space exploration. The Russian MIR spacecraft (1986-2001) carried ham radio and SSTV equipment. Between 1983 and 1999, ham radio licensed astronauts participated in the SAREX programme during 28 space shuttle flights. They

carried out 1000s of QSOs with hams on Earth and made the first space to space ham QSOs to chat to other hams aboard the MIR space station.
Currently the International Space Station (ISS) carries ARISS -amateur radio aboard ISS, which is used for educational conversations with school children around the world, QSOs between hams and the space station crew, an FM repeater, SSTV (slow scan television) pictures, packet radio and APRS (amateur radio positioning system). So if you are lucky you could chat to an Astronaut on the space station.
Probably the most unique HAMSAT so far is 'SuitSat', a redundant Russian Orlan spacesuit fitted with a radio transmitter, some instrumentation, and padded out with unwanted laundry. The 'Expedition 12' crew launched SuitSat from the international space station on February 3rd 2006. AMSAT designated SuitSat as AMSAT OSCAR 54 (AO-54). The satellite transmitted a digital recording of the voices of school children on 145.990 MHz. Unfortunately the signal was much weaker than expected, probably due to a broken antenna. SuitSat was last heard on the 18th of February 2006 and has now burned up in the Earth's atmosphere. There are plans for more satellites to be launched by hand from the ISS and the first, 'ARRISSAT' is due to be launched in 2010.
Amateur satellites can be grouped according to their orbit. High Earth Orbit (HEO) satellites usually have large elliptical (Molniya) orbits. For example AO-40 has an apogee (farthest point from Earth) of 58,776km and a perigee (nearest point to Earth) of 1044km. The "footprint" or coverage area of HEO satellites is almost a complete hemisphere of the Earth, a ZL station could expect to work stations in all of Europe, Asia, the Americas and parts of Africa. Unfortunately neither of the two most successful HEO HAMSATS are still in operation. In January 2004, after three successful years in orbit, AO-40 suffered failure of all transponders due to failure of the main battery.
Low Earth Orbit (LEO) satellites have smaller elliptical or near circular orbits typically with a perigee of around 680km – 800km and an apogee of 800-1320km. Since the LEO satellites are closer to Earth, the coverage area or "foot print" is much smaller than the foot print of HEO satellites. A ham in New Zealand can expect to be able to work all of New Zealand and Australia through the LEO OSCAR satellites. The ISS has a nearly circular orbit 333 perigee–348km apogee.
There are many exciting HAMSAT projects in progress around the world. In Germany a team is working on P3E "Express" a high orbit satellite which will carry a whole range of transponders plus a camera and other experiments.
The local New Zealand AMSAT group is working on KiwiSAT a micro satellite which will carry amateur radio FM and linear transponders and a scientific experiment in Small Satellite Attitude Control.

Modes and Bands

The amateur satellites of most interest to the ham radio community are those which carry transponders for relaying signals back to Earth. Some satellites carry linear transponders, which allow multiple users and transmission types, including SSB, CW, FM, SSTV, and PSK. Some have FM voice transponders which work like cross band repeaters and some satellites carry digital transponders, which receive, regenerate and then re-transmit digital data. Digital transponders are usually used for packet bulletin board systems (BBS), digipeaters and APRS.
Most satellite operation uses the satellite portions of the 2m and 70cm bands. Currently only AO-51 "Echo" has the capability to operate on L band (1268MHz) and S band (2401MHz). The P3E "Express" satellite is proposed to have transponders on bands ranging from 29MHz to 47GHz.
Satellite transponders are often referred to by 'mode' rather than referring to the type of transmission SSB, FM etc. The mode relates to the frequency bands used by the satellite transponder. VU mode means that the satellite uplink is on VHF band (2m) and downlink is on UHF (70cm). Conversely UV mode means that the satellite uplink is on UHF band (70cm) and downlink is on VHF (2m). LS mode has a 1268MHz uplink and a 2401MHz downlink. Some linear transponders are "reverse tracking" so that as the uplink frequency increases, the downlink frequency decreases. Generally this type of transponder is also "inverted", the transponder reverses the sidebands so that LSB input to the satellite becomes USB on the downlink.

Equipment requirements for working HAMSATS

The minimum requirement for ground station transceivers is a dual band FM handheld, but for serious satellite work a multi-mode transceiver capable of full duplex crossband operation (2m / 70cm), such as the Yaesu FT-847, Icom IC-910H or Kenwood TS2000 is desirable. Other multi-mode transceivers such as the IC-9100, FT-857 and FT-897 that can be controlled via PC software are also very suitable. Alternatively the station can consist of separate FM or multi mode transceivers for 2m and 70cm. Some satellites have a 'mode A' downlink, which requires a 10m HF receiver. L band operation can be achieved with a transmit converter, or some transceivers have optional built in L band modules. S band operation is usually achieved using an S band to 2m, or S band to 70cm down-converter mounted at the antenna.
For working LEO satellites Yagi antennas with 5 to 10 elements on 2m and 12 elements on 70cm are quite acceptable. It is best if these can be pointed at the satellite using a PC controlled azimuth and elevation rotator, but many operators track the satellites manually. A popular starting point is the 'Arrow' antenna, a simple hand held Yagi made with wire elements mounted on a broom handle. These can be made for a few dollars and designs are available on the Internet. Almost any antenna capable of working on 70cm and 2m will get you started on the FM satellites when they are at high elevations. There is a significant advantage in using circular polarised antennas for satellite work. Circular polarised antennas minimise the effects of cross polarisation fading caused by the satellites' changing position, possible spin modulation (fading due to satellite rotation), and on HEO satellites a small amount of Faraday rotation. The convention is to use antennas made with right hand circular polarisation (rhcp).
For HEO satellite operation, high gain circular polarised (rhcp) antennas such as crossed Yagis, loop Yagis, or helix antennas are required. For L band (23cm), helix, or parabolic dish antennas are usually used. For S band (13cm) operation parabolic dish antennas fed with small helix or circular polarised patch feeds are normal, although long helix antennas are sometimes used.

Satellite tracking

To work stations through the HAMSATS , you need to know when the satellite will be above the horizon and where to point your antenna(s). Most satellite operators use one of the many satellite tracking programs available on the Internet. Programs include Instant Track, Wisp, Orbitron, Nova, Winorbit, Satscape and SatPC32. The current favourite is SatPC32, which offers rig control with automatic Doppler correction, rotator control, tracking of multiple satellites, display of the ground track and satellite coverage footprint. If you have not installed tracking software, you can get a display of the next 10 passes for many amateur satellites by using the 'Passes' tool on the AMSAT NA web site.
Three things are critical for accurate satellite tracking. Firstly the tracking program will need your QTH location, (latitude and longitude). Some software can calculate your location from your Maidenhead grid square. Secondly the program will need up to date Kepler data, which can be downloaded from AMSAT, Celestrak or other web sites. The Kepler data describes the orbit of the satellites. Finally the clock on your PC needs to be accurate. A two-minute error on your PC clock could result in your antenna pointing 36 degrees away from the true position of the satellite and of course the Doppler adjustment would also be way out. Freeware utilities such as Dimension 4 can reset your PC clock very accurately. Kepler data should be updated at least monthly.

Satellite Glossary

OSCAR – **O**rbital **S**atellite **C**arrying **A**mateur **R**adio
AOS–**a**cquisition **o**f **s**ignal. Time the satellite appears above the horizon.
LOS–**l**oss **o**f **s**ignal. Time the satellite sets below the horizon.
Uplink – the signal you send to the satellite.
Downlink – the signal you receive from the satellite.
Mode – frequency band of uplink and downlink (UV, VU, LS, VA).
Pass – the time the satellite is above the horizon and can be used.
Passband – frequency bandwidth of a transponder (FO-29 has a 100kHz passband).
Beacon – most satellites have a cw or telemetry beacon transmitter on a fixed frequency, some have several.
Linear transponder – a wide band linear repeater. It accepts a range of frequencies on the input and retransmits the entire range on the output.
Repeater – a single frequency transponder, just like a standard FM repeater except it works cross band. All satellite repeaters and transponders are full duplex, meaning you can and should listen to your signal on the downlink while you are transmitting.
Digipeater – a transponder

which receives then regenerates a digital signal and retransmits it on the same or another frequency. As opposed to a repeater which does not regenerate the digital signal.

Pilot tone – some FM satellites need a tone, usually 67.0Hz on your transmission to open the satellite receiver squelch. This is similar to the tones required for many terrestrial repeaters. Most modern rigs can generate these DCS tones. For example SO-50 needs 74.4Hz for a few seconds to turn on a 10 minute timer, then 67.0Hz on each transmission.

Inverted – The satellite receives on LSB and transmits on USB. Generally inverted transponders are also "reverse tracking".

Reverse tracking – The downlink frequency increases as the uplink frequency decreases. Generally reverse tracking transponders are also "inverted".

Kep data – Reference Kepler data downloaded as a text file. Kepler data describes the orbit of the satellite so that the tracking software can calculate the time that the satellite will be available at your location and the position of the satellite.

Doppler – frequency shift of both the uplink and downlink signals caused by the speed of the satellite relative to your position. Doppler shift is greater on higher frequencies.

Analog satellite – satellite transponder for voice or cw, (or audio based digital transmissions like SSTV and PSK).

Digital satellite – satellite transponder for digital modes, often AX25 FSK, used for APRS, packet bulletin boards, digipeaters or packet store & forward.

ISS – **I**nternational **S**pace **S**tation.

ARISS – **A**mateur **R**adio aboard the **I**nternational **S**pace **S**tation

Perigee – satellite orbit closest point to Earth.

Apogee – satellite orbit farthest point from Earth

Footprint – area on the Earth's surface covered by a satellite's antennas. Higher satellites have bigger footprints.

Spin modulation – fluttering or fading caused by the satellite spinning or tumbling.

Attitude – angle of the satellite with respect to Earth.

Squint – angle of satellite's antennas with respect to your location. (If the satellite's antennas point straight down they are not pointing directly at your QTH).

Some of the Currently Operational Amateur Radio Satellites

For operating information see the AMSAT (NA) web site, the KD5QGR web site and the weekly satellite summary at; rec.radio.amateur.space

AO-7 AMSAT OSCAR 7

AO-7 was launched November 15 1974, it is the oldest HAMSAT in orbit and is still operating after an amazing 36 years in space. AO-7s batteries are dead, but the satellite transponders still work, powered by the solar panels, while the satellite is in sunlight. Uplink power must be kept to an absolute minimum otherwise the current drain exceeds the power that can be supplied by the solar array and the satellite suffers from FM distortion on the downlink transmitter. As AO-7 resets each time it comes into sunlight, it can come up in either mode A, (VA) or mode B (UV) randomly each pass. There is also a timer which toggles the transponder mode part way through some orbits. Recently AO-7 seems to be favouring mode B. Check out the AO-7 log and resource web site and for the benefit of others please fill in the log even if you only heard the beacon or your own downlink.

SO-50 SaudiSat-1c

SO-50 is an FM repeater in space. It has a mode V/U FM voice repeater with an uplink on 145.850 MHz and downlink on 436.795 MHz. SO-50 requires a user to send a short transmission with a 'pilot' tone of 74.4Hz to set a 10 minute timer. After that each transmission requires a pilot tone of 67.0Hz to open the receiver squelch on the satellite. SO-50 can be tricky to wake up, but when active is very sensitive. At high elevations it can be operated with a handheld dual band transceiver.

AO-51 Echo

AO-51 has the most transponders of any of the currently active satellites. It operates simultaneous digital and analog transponders usually in VU mode. For a few days each month other modes such as AU, VS, LU or LS may be operating. The normal analog transponder is an FM mode VU voice repeater. The packet BBS and APRS broadcast transponder uses callsigns Broadcast: PECHO-11 and BBS: PECHO-12. For an up to date schedule check the AO-51 web site.

VO-52 Hamsat

VO-52 has two UV mode linear transponders but only one is active at any given time. If the cw beacon on 145.860MHz is active the Dutch made transponder is operational, if the unmodulated beacon on 145.936MHz is active, the Indian transponder is operational. Both transponders have the same 60kHz bandwidth and similar downlink power. VO-52 has a reverse tracking, inverting transponder.

ARISS Amateur Radio aboard the International Space Station

ISS carries an FM 2m mobile for use by the crew for educational and amateur radio use. Mode VV uplink for region 3 is 144.490 MHz and downlink for all modes is 145.800MHz. Crew contacts are dependant on the spare time available to the space station crew. When the transceiver is not in use by the crew it is often setup as a 1200bps AFSK digital transponder, with an uplink of 145.990MHz and downlink of 145.800MHz. ARISS is often used to relay APRS beacons and also carries a packet BBS. Occasionally the ARISS station has been transmitting SSTV pictures on a downlink frequency of 144.4900 MHz. A second transceiver is scheduled to be installed in a different ISS module late 2010.

TV and weather satellites. Many hams receive signals from geostationary broadcast TV satellites. This can include foreign language broadcasts and direct feeds intended for television stations. Satellite weather images can be received using an HF receiver and decoding software downloaded from the Internet.

Web pages

AMSAT NA main page
http://www.amsat.org

AMSAT satellite status
http://www.amsat.org/amsat-new/satellites/status.php

Amateur radio satellite history
http://www.spacetoday.org/Satellites/HAMSATS/HAMSATS Basics.html

http://www.amsat.org/amsat/sats/n7hpr/history.html

OSCAR 7 Log and resource page
http://www.planetemily.com/ao7/main.php

Kepler data and related tutorials & information
http://celestrak.com

General interest satellite site and Kepler information
http://www.mindspring.com/~n2wwd/html/amsat_keps.html

Dimension 4–reset PC clock to atomic standard
http://www.thinkman.com/dimension4

SatPC32 home page
http://www.dk1tb.de/indexeng.htm

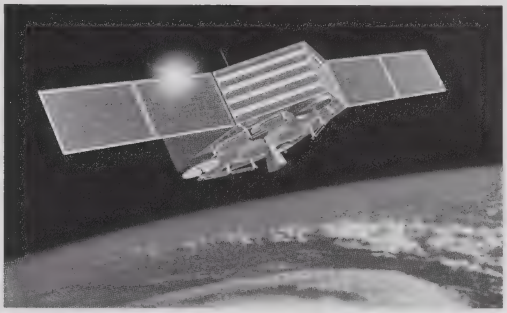
Satellite operation is initially challenging but is very interesting. It is easy to work hams all over Australia and New Zealand. Everyone is keen to help out new comers so give it a try and make it known that you don't have much satellite experience. There is a regular 'Satellite orbits' column in Break-in and news of local activities is always most welcome. For more information on amateur satellites check out the Internet web links listed above. A series of introductory articles on satellite operation is available from the author, zl3dw@nzart.org.nz .

SATELLITE OPERATING FREQUENCIES

Frequency	OSCAR	Satellite	Service	Mode	Status
29.502	AO-07	AMSAT-OSCAR 7	TLM Beacon Downlink	CW	Semi-Operational
145.978	AO-07	AMSAT-OSCAR 7	TLM Beacon Downlink	CW	Semi-Operational
435.100	AO-07	AMSAT-OSCAR 7	Beacon Downlink	FM	Semi-Operational
145.850 - 145.950	AO-07	AMSAT-OSCAR 7	Linear Transponder Uplink	SSB/CW	Semi-Operational
145.975 - 145.925	AO-07	AMSAT-OSCAR 7	Linear Transponder Downlink	SSB/CW	Semi-Operational
29.400 - 29.500	AO-07	AMSAT-OSCAR 7	Linear Transponder Downlink	SSB/CW	Semi-Operational
432.125 - 432.175	AO-07	AMSAT-OSCAR 7	Linear Transponder Uplink	SSB/CW	Semi-Operational
145.920	AO-16	AMSAT OSCAR 16	FM Voice Repeater Uplink	FM	Semi-Operational
437.026	AO-16	AMSAT OSCAR 16	FM Voice Repeater Downlink	FM	Semi-Operational
145.850	AO-27	AMRAD-OSCAR 27	FM Voice Repeater Uplink	FM	Operational
436.795	AO-27	AMRAD-OSCAR 27	FM Voice Repeater Downlink	FM	Operational
145.880	AO-51	AMSAT-OSCAR 51	FM Voice Repeater Uplink	FM	Operational
145.880	AO-51	AMSAT-OSCAR 51	FM Voice Repeater Uplink	FM	Operational
145.920	AO-51	AMSAT-OSCAR 51	FM Voice Repeater Uplink	FM	Operational
435.150	AO-51	AMSAT-OSCAR 51	FM Voice Repeater Downlink	FM	Operational
435.150	AO-51	AMSAT-OSCAR 51	PacSat BBS Downlink	AFSK	Operational
435.300	AO-51	AMSAT-OSCAR 51	FM Voice Repeater Downlink	FM	Operational
435.300	AO-51	AMSAT-OSCAR 51	FM Voice Repeater Downlink	FM	Operational
1268.700	AO-51	AMSAT-OSCAR 51	FM Voice Repeater Uplink	FM	Operational
1268.700	AO-51	AMSAT-OSCAR 51	FM Voice Repeater Uplink	FM	Operational
1268.700	AO-51	AMSAT-OSCAR 51	PacSat BBS Uplink	AFSK	Operational
2401.200	AO-51	AMSAT-OSCAR 51	FM Voice Repeater Downlink	FM	Operational
2401.200	AO-51	AMSAT-OSCAR 51	FM Voice Repeater Downlink	FM	Operational
144.490	ARISS	ARISS	Crew Contact Uplink	FM	Operational
145.200	ARISS	ARISS	Crew Contact Uplink	FM	Operational
145.800	ARISS	ARISS	APRS Uplink	FM	Operational
145.800	ARISS	ARISS	Crew Contact Downlink	FM	Operational
145.800	ARISS	ARISS	Crew Contact Downlink	FM	Operational
145.800	ARISS	ARISS	FM Voice Repeater Downlink	FM	Operational
145.800	ARISS	ARISS	FM Voice Repeater Uplink	FM	Operational
145.800	ARISS	ARISS	Imaging Downlink	FM	Operational
145.800	ARISS	ARISS	Packet Downlink	AFSK	Operational
145.990	ARISS	ARISS	Packet Uplink	AFSK	Operational
437.800	ARISS	ARISS	FM Voice Repeater Downlink	FM	Operational
437.800	ARISS	ARISS	FM Voice Repeater Uplink	FM	Operational
436.838	CO-55	CubeSat-OSCAR 55	TLM Beacon Downlink	FM	Operational
437.400	CO-55	CubeSat-OSCAR 55	Telemetry Downlink	FM	Operational
436.848	CO-57	CubeSat-OSCAR 57	Beacon Downlink	FM	Operational
437.490	CO-57	CubeSat-OSCAR 57	Telemetry Downlink	FM	Operational
437.345	CO-58	CubeSat-OSCAR 58	Telemetry Downlink	FM	Operational
437.465	CO-58	CubeSat-OSCAR 58	Beacon Downlink	FM	Operational
437.275	CO-65	Cubesat Oscar-65	TLM Beacon Downlink	FM	Operational
437.475	CO-65	Cubesat Oscar-65	Digital Downlink	GMSK	Unknown
437.475	CO-65	Cubesat Oscar-65	TLM Beacon Downlink	AX.25	Operational
1267.600	CO-65	Cubesat Oscar-65	Digital Uplink	GMSK	Unknown
437.485	CO-66	Cubesat Oscar - 66	Digitalker Downlink	FM	Operational
437.485	CO-66	Cubesat Oscar - 66	Other Downlink	FM	Operational
437.485	CO-66	Cubesat Oscar - 66	TLM Beacon Downlink	FM	Operational
437.485	CO-66	Cubesat Oscar - 66	TLM Beacon Downlink	FM	Operational
145.870	DO-64	Delfi OSCAR-64	Telemetry Downlink	FM	Operational
145.930	DO-64	Delfi OSCAR-64	Telemetry Downlink	FM	Operational
435.795	FO-29	Fuji-OSCAR 29	Beacon Downlink	FM	Semi-Operational
435.910	FO-29	Fuji-OSCAR 29	Digitalker Downlink	FM	Unknown
145.900 - 146.000	FO-29	Fuji-OSCAR 29	Linear Transponder Uplink	SSB/CW	Operational

Frequency	OSCAR	Satellite	Service	Mode	Status
435.800 - 435.900	FO-29	Fuji-OSCAR 29	Linear Transponder Downlink	SSB/CW	Operational
145.890	GO-32	Gurwin OSCAR-32	PacSat BBS Uplink	FSK	Semi-Operational
435.225	GO-32	Gurwin OSCAR-32	PacSat BBS Downlink	FSK	Semi-Operational
435.325	GO-32	Gurwin OSCAR-32	TLM Beacon Downlink	FM	Semi-Operational
145.825	HO-68	Hope Oscar 68 (XW-1)	FM Voice Repeater Uplink	FM	Operational
145.825	HO-68	Hope Oscar 68 (XW-1)	PacSat BBS Uplink	AFSK	Operational
435.675	HO-68	Hope Oscar 68 (XW-1)	FM Voice Repeater Downlink	FM	Operational
435.675	HO-68	Hope Oscar 68 (XW-1)	PacSat BBS Downlink	AFSK	Operational
435.790	HO-68	Hope Oscar 68 (XW-1)	Beacon Downlink	FM	Operational
145.925 - 145.975	HO-68	Hope Oscar 68 (XW-1)	Linear Transponder Uplink	SSB/CW	Operational
435.765 - 435.715	HO-68	Hope Oscar 68 (XW-1)	Linear Transponder Downlink	SSB/CW	Operational
437.125	LO-19	LUSAT-OSCAR 19	TLM Beacon Downlink	FM	Operational
145.850	MO-46	Malaysian-OSCAR 46	Packet Uplink	FSK	Unknown
145.925	MO-46	Malaysian-OSCAR 46	Packet Uplink	FSK	Unknown
437.325	MO-46	Malaysian-OSCAR 46	Packet Downlink	FSK	Unknown
437.325	MO-46	Malaysian-OSCAR 46	Packet Downlink	FSK	Unknown
145.827	NO-44	Navy-OSCAR 44	APRS Uplink	AFSK	Semi-Operational
29.353	RS-15	Radio-Sputnik 15	Beacon Downlink	CW	Semi-Operational
29.399	RS-15	Radio-Sputnik 15	Beacon Downlink	CW	Semi-Operational
145.858 - 145.898	RS-15	Radio-Sputnik 15	Linear Transponder Uplink	SSB/CW	Semi-Operational
29.354 - 29.394	RS-15	Radio-Sputnik 15	Linear Transponder Downlink	SSB/CW	Semi-Operational
435.352	RS-22	RS-22	TLM Beacon Downlink	FM	Operational
435.215	RS-30	RS-30	TLM Beacon Uplink	CW	Operational
435.315	RS-30	RS-30	TLM Beacon Uplink	CW	Operational
437.910	SO-33	SEDSat-OSCAR 33	Packet Downlink	FSK	Semi-Operational
1266.687	SO-33	SEDSat-OSCAR 33	Packet Uplink	FSK	Semi-Operational
145.850	SO-50	Saudi-OSCAR 50	FM Voice Repeater Uplink	FM	Operational
436.795	SO-50	Saudi-OSCAR 50	FM Voice Repeater Downlink	FM	Operational
145.875	SO-67	Sumbandila Oscar 67	FM Voice Repeater Uplink	FM	Semi-Operational
435.345	SO-67	Sumbandila Oscar 67	FM Voice Repeater Downlink	FM	Semi-Operational
145.826	UO-11	UoSat OSCAR 11	TLM Beacon Downlink	FM	Semi-Operational
145.860	VO-52	VUSat OSCAR-52	Beacon Uplink	CW	Operational
145.936	VO-52	VUSat OSCAR-52	Beacon Downlink	Carrier	Operational
145.925 - 145.875	VO-52	VUSat OSCAR-52	Linear Transponder Downlink	SSB/CW	Operational
145.930 - 145.870	VO-52	VUSat OSCAR-52	Linear Transponder Downlink	SSB/CW	Operational
435.220 - 435.280	VO-52	VUSat OSCAR-52	Linear Transponder Uplink	SSB/CW	Operational
435.225 - 435.275	VO-52	VUSat OSCAR-52	Linear Transponder Uplink	SSB/CW	Operational
436.000	-	BEESAT	TLM Beacon Downlink	CW	Operational
436.000	-	BEESAT	TLM Beacon Downlink	FM	Operational
436.000	-	BEESAT	TLM Beacon Downlink	FM	Operational
435.245	-	CAPE-1	Beacon Downlink	FM	Semi-Operational
145.825	-	Castor	TLM Beacon Downlink	FM	Unknown
437.275	-	COMPASS-1	TLM Beacon Downlink	FM	Semi-Operational
437.405	-	COMPASS-1	Telemetry Downlink	FM	Unknown
437.075	-	GeneSat-1	TLM Beacon Downlink	FM	Operational
437.325	-	ITUpSAT1	Beacon Downlink	CW	Operational
437.325	-	ITUpSAT1	TLM Beacon Downlink	FM	Operational
437.385	-	KKS-1	Beacon Downlink	FM	Operational
437.445	-	KKS-1	Digital Downlink	FM	Operational
437.325	-	PARADIGM	TLM Beacon Downlink	FM	Unknown
437.325	-	PARADIGM	TLM Beacon Downlink	FM	Unknown
437.325	-	PARADIGM	TLM Beacon Downlink	FM	Unknown
29.400	-	PCSat2	Digital Uplink	PSK	Semi-Operational
145.825	-	PCSat2	APRS Uplink	AFSK	Semi-Operational
145.850	-	PCSat2	APRS Uplink	AFSK	Semi-Operational
435.275	-	PCSat2	APRS Downlink	AFSK	Semi-Operational
435.275	-	PCSat2	Digital Downlink	PSK	Semi-Operational

Frequency	OSCAR	Satellite	Service	Mode	Status
435.275	-	PCSat2	Telemetry Downlink	AFSK	Semi-Operational
437.250	-	PRISM	TLM Beacon Downlink	FM	Operational
437.425	-	PRISM	TLM Beacon Downlink	FM	Semi-Operational
437.425	-	PRISM	TLM Beacon Downlink	FM	Semi-Operational
437.275	-	STARS	Beacon Downlink	FM	Unknown
437.305	-	STARS	Beacon Downlink	FM	Unknown
437.465	-	STARS	Beacon Downlink	FM	Unknown
437.485	-	STARS	Beacon Downlink	FM	Unknown
437.505	-	SwissCube	Beacon Downlink	CW	Operational
437.505	-	SwissCube	TLM Beacon Downlink	FSK	Operational
437.385	-	UWE-2	TLM Beacon Downlink	FM	Operational



Above: Satellite AO-40

Left: Kiwi-Sat

AN INTRODUCTION TO THE WORLD OF DX

by Lee Jennings ZL2AL

DXing is addictive

The greatest lure in amateur radio is to contact someone else in another country. When you first start out into the world of DXing, DX may be 100km but later you will work into every corner of the planet. With some hams, it becomes an absolute obsession and they will go to any length to contact that country they haven't worked yet. For others, it is a pleasure to rag chew with an amateur in a foreign country and to learn more about that country and its culture. DXers often end up meeting other DXers when they travel and many lifelong friendships are made this way. DXing is a competitive sport. You will find out the moment that you hear some rare DX that a thousand other hams heard that same station and are also calling at the same instant. The problem is that many of your competitors are outstanding operators with high power, excellent antenna systems and vast experience. Most of your competitors are average operators with average

stations and antennas and they are easy to compete with. You just have to be a bit more cunning with your skills but eventually you can work up to competing with the top group. That rare DXpedition will usually work the big guns first and then you can easily make the contact at the end of their stay at the rare location.

Currently there are 338 DXCC "Entities "eligible for the ARRL DXCC award program. DXCC is the premier award in ham radio and entry to the "Club" may be gained by working and confirming 100 entities. An Entity can be as large as Australia or as small as St Peter and Paul Rocks out in the South Atlantic Ocean. There are rules that govern what constitutes an "Entity" and they may be found on the ARRL Website where you can find the rules for the various awards and download the application forms. CQ Magazine in the USA that runs the Worked All Zones awards program and sponsors major contests throughout the year has the rules on their web-site also. Usually you start off with trying to work the first one hundred countries or entities and that will be a milestone for you. It will teach you how to get involved with a pileup and how to be a bit cunning when you do. It will teach you that other DXers in other countries may not have the same sense of fair play as you do. The second 100 countries are a little more difficult to work. Achieving 300 countries is very difficult and will usually take many years for a variety of reasons including sunspot cycles, the rarity of the country and how often its government will allow amateurs to operate there. Currently (2008) there are 338 DXCC Entities and the last 35 entities are extremely

difficult to work. Very few ZL amateurs have managed to do It. But the challenge is always there and it becomes a passion to achieve It.

Strategies for successful DXing

There are some proven strategies that work. Listen to the operator and find out where he is listening and if he is working split frequencies. Working "split is not difficult, just different. It's a new skill for you to learn. Find out where the thousands of other operators are transmitting and avoid the pack. Position yourself just off the edge of the pack. Refine your timing so that you will be heard in a "gap" rather than in with the pack. Placement and timing is everything. Your signal should be slightly out of the pack so you will be noticed and your call should be slightly out of sync with the pack and just delayed a bit so that he will hear you start your call but not delayed long enough that you are calling on top of the guy the DX station has already decided to work and is answering. Successful experienced DXers are extremely skilful with their timing and consequently work the DX. You may not be heard on your first or second call or even after a few hours of calling. Be patient! Sometimes it's an exercise in pure frustration but persistence usually wins and it's an absolute joy when you snag that new country. Top level DXing is not easy but you will learn that amateur radio is more than inhabiting your local 2 metre repeater. You will also be rewarded with friendships around the world and an understanding of other cultures.

Is CW worth the effort?

It really is true that it's easier to work DX on CW than on Phone because there are fewer stations clamouring for the attention of a DX station on CW. CW will still be around for the foreseeable future in spite of recent changes in amateur licence regulations around the world. Weak CW signals are more readable than weak Phone signals. Hone your CW skills. DX stations often run 20 wpm or more and while most of them are courteous and will come back to a station calling at 12 or 15wpm, it's very satisfying to be able to work them at the speed they're calling CQ. Life is much easier with an electronic keyer as it takes the work out of sending your call over and over. There is nothing worse than operating with a pair of uncomfortable, ill fitting, harsh sounding headphones. Invest in a good set of headphones to help you dig out the weak ones and avoid fatigue, A better idea is to buy a quality boom microphone headset with a good sounding microphone cartridge.

Work the contests

Contests can be intimidating, but your best chance for working new countries is often during the DX contests. Contest groups often will activate multi-multi stations in rare countries and they are easy to work. I recall working CN2R in Morocco on 80m a few years ago. Re was S9+ and begging for 80 m contacts and very easy to work. You don't do not have to work the entire contest, nor do you have to send in the logs for scoring. Figure out what information they're expecting you to exchange with them, either by listening to several contest QSOs or by reading the contest rules on www.contesting.com then just jump in and start working stations.

What bands to operate

The seven popular amateur radio bands offer the DXer propagation to most parts of the world most of the time. When the sunspot count is between the eleven year peaks, the higher bands like 10, 12, 15, 20 M are poor and opportunities are limited. 40M and 80M come into their own and some excellent DXing abounds providing you have good antennas. DXing is more difficult on 80 and 160m because the ambient noise levels are often intolerable in urban areas. When the propagation is right and the bands are open at sunrise and sunset, 80 and 160m can be extremely rewarding with worldwide contacts. We are fortunate here in the Asia Pacific region as many rare DXpeditions take place and are easy to work on the lower bands. When the sunspots reach maximum every eleven years the higher bands are magic. The next peak will be in 2012. 10, 12 and 15m will often be open 24 hours a day and It is relatively easy to work 100 countries during a weekend contest. Having a ZL call is a wonderful asset. ZLs are reasonably rare in other parts of the world and there are not that many ZL DXers to compete with. ZLs are often the first "real" DX station that Europeans work. ZL DXers are respected around the world and we have some world class Kiwi DXers amongst us. It is not uncommon to call a CQ on 15 or 20M and generate a pileup of Europeans or North Americans that may go on for hours.

Operating aids

The DXer has far more tools at his disposal than he had 30 or 40 years ago. Then, you heard a rumour, read monthly DX magazines or received a phone call from a trusted friend. You listened daily, you waited and finally you would hear that weak rare station and attempt to work him with primitive valve equipment. Today's modern DXers have computers with the Internet based newsgroups, real time packet clusters, propagation prediction programs and information not dreamt of by old timers in the game. Today one knows where and when the rare DX will operate. With a few mouse clicks the modern well equipped station will change the radio to that frequency and mode, track the amplifier to the right band, select the correct antenna system, turn the beam to the heading and set his call up in the logging program in a few seconds. Sounds easy! The reality is that you still have to use your skills to get your call in his electronic logbook. And it doesn't get any easier as thousands of other hams have the same technology. Below are some web links to programs and services that will help you work DX.

www.ac6v.com/ -The definitive reference site for ham radio—Over 6000 links.

www.dxatlas.com/ – DX Atlas, a great program for DXCC, WAZ, IOTA info plus brilliant Grayline and path headings.

www.qrz.com – The online address and QSLing data base for most hams around the world.

www.eham.com – A great source of info on general ham radio

www.contesting.com – Keep up to date with international contests

www.dx4win.com/ – Excellent logging program.

www.writelog.com/ – Excellent contest logging program.

www.kc4elo.com/index.html – Free but very good logging program.

www.eqf-software.com –Some great logging programs.

www.qsl.net/w6elprop/ – Propagation prediction (and it's free!).

www.rchalmas.users.ch – DX Cluster program (and it's free!).

<*www.yahoo.com.*> Subscribe to the KiwiDX List Newsgroup You will be in touch with other keen DXers around New Zealand.

<*www.cq-amateur-radio.com/awards.html*> The CQ Magazine awards and contest website.

www.arrlorg/awards/dxcc/ The ARRL DXCC awards and contest website.

www.dxawards.com/book.html – The K1BV Awards directory listing for 3227 awards.

www.oh2aq.kolumbus.com/dxs/ – The DX Summit–Live DX cluster spots 24 hours a day.

www.ac6v.com/morseaids.htm– The definitive web page on Morse code – worth going to even if you don't understand it or use it!

Packet cluster networks

Packet clusters have been a phenomenon of the DXing world over the past 10 or 15 years. Basically It works like this. There may be a local Internet based Cluster or VHF packet channel Cluster in a city in Europe somewhere and a group or cluster of hams are connected to it. When someone in the group works a rare station he types into his cluster software the details in the following format: DX 14015 ZD9BV Calling CQ. The last comment is optional. The message or "spot" immediately appears on the screens of all connected to that cluster. Most clusters are now linked to the internet and there are more than 1000 of them around the world in every populated area. As soon as that spot hits the internet it spreads to all the cluster nodes and you will see it on your screen in your shack. In fact you will see a continuous stream of DX stations, Announcements and WWV information on your screen 24 hours a ay. There are many free programs available. DX packet clusters are a wonderful tool for chasing DX

Minimum-maximum Station gear

There are some facts to consider when you are thinking about investing in equipment for your station.

1 The Operator on the other end can't tell whether you have the latest all singing, all dancing multi featured transceiver costing in excess of $8K or a 30 year old valve radio you picked up at a junk sale for $300. 100W is 100W. Both are equal. The only difference is that the older radio may not have all the latest modern features.

2 The stations with the 30m towers and stacked 5-el monobanders driven by very large amplifiers will often beat you in a pileup. These are the guys that work the rare DX first and they love doing it. After they have done It ... they go away and let the rest of us work the station. As long as you are aware of the big guns, it's not a problem because time

will be kind to you.

3 The stations that have the "best" sounding audio will always win in a pileup. It is human nature that the DX station will always take the path of least resistance and work the station he can understand and clearly hear the easiest. Best means clean, punchy and standing out from the rest. Commercial broadcast announcers are picked because of their mellow authoritative voices. Be aware of your own limitations and strive for the best audio you can generate. An authoritative voice helps!
4 With CW–You will need an electronic keyer and clean keying set a bit below the pack's general speed. This is better than trying to impress the DX station that your electronic keyer can do 45 wpm with ease. He can't! – Well, actually some DX ops can but they are rare.
5 At the end of the day everything helps, but don't get hung up on particular antennas or brands of radio equipment. They are only part of the picture. A good antenna is the second best investment you will ever make. The first is taking the time to learn the techniques and skills of how a rare DX station thinks and operates. A cunning operator will outwit a big antenna every time!

Computer logging

Computer logging programs are almost essential for those who have a large number of QSOs. Over time they become one of the best tools around for keeping things in order. Don't start out with a cheap shareware logging program. A key factor in a logging program is to be able to display various award details in DXCC entity order as one has them worked or confirmed. The main prestige awards are DXCC, WAZ, DXCC Challenge, WAS, WAC, IOTA There are thousands of others. When you want to see how your goals are being met, you can look at your statistics right on the computer screen. Computer logging programs are a great time saver because most of them generate data and address labels that will save hours and hours of handwriting. Computer logging can keep track of QSLs sent and received with just a click of the mouse. A really good computer logging program will do all of the above and control your radio, send CW, display your local packet cluster DX spots and print the QSO information directly onto your QSL cards with no labels involved.

The process of QSLing

If a newcomer to DXing starts out by working DX stations during contests he will quickly learn that he will work key countries multiple times. I would make the bureau one of my first choices The QSL Buro Service here in New Zealand is excellent and It will save you postage costs. If you use the NZ Buro a lot make a donation every now and then! My best advice is to save your postage dollars and greenstamps (One US Dollar) for your rare station direct QSL requests. Confirming DXCC takes time and by the time one gets close to 100 different confirmed countries, several months or years will pass. There are several systems of filing, and the one that is probably the most common is to keep QSLs in order by DXCC entity. Shoeboxes help and they are inexpensive. There are some neat boxes sold buy the big chain stores here in New Zealand to file photographs in and they are excellent for QSLs. Keeping QSLs in DXCC entity order is the first step in being able to find and sort cards for awards later down the line. Believe me, it is not an easy task to sort a couple of thousand QSLs from scratch. Be smart and start sorting at the very beginning.

Awards and rewards

The ARRL DXCC Program

ARRL DXCC Honour Roll, 5 Band DXCC, WAS, 5BWAS, the DXCC Challenge Award and the CQ WAZ awards are the most prestigious awards in ham radio. Actually, there are over 3200 awards available to wallpaper your shack. Only the above few really measure how well you compete with other DXers around the rest of the world. In fact the list of awards that can be earned for working certain collections of DX stations is almost endless. www.ac6v.com/ will give you a link to the universal awards page. We have some world class DXers in New Zealand but only a few ZLs have managed to achieve the ARRL DXCC Honour Roll award. We now have a authrized ARRL DXCC Card checker in New Zealand which means you do not have to send your precious cards to the USA for verification. Contact Lee ZL2AL leejen@paradise.net.nz for further information. Your DXCC QSOs may also be verified online on the ARRLs website LoTW (Logbook of the World)

DXpeditions

If DXing is an obsession, then DXpeditioners are the lunatic fringe of the DX world. At any given time these are hundreds of amateurs operating from rare locations around the world. You can be assured that there are thousands of others actively planning a DXpedition somewhere and hundreds of thousands of "armchair DXpeditioners"who would love to go. Planning a major Dxpedition is almost as com- plicated as a NASA mission. Large scale modern DXpeditions can chew through $200,000 or more in no time so it isn't a project that can be taken on lightly. New Zealand just happens to have ten or more of some the rarest DXCC entities islands within its territory. ZL7–Chatham Island, ZL8–Raoul Island and ZL9–Campbell and Auckland Islands are usually in the top 25 most wanted entities. The demand continues unabated and opportunity abounds for ZLs to organize more trips to these desired locations. It is the experience of a lifetime to participate as an operator on a DXpedition. The camaraderie und experience gained is incomparable. DXpeditions to ZL7 are easily organized, tremendous fun and are to be recommended for gaining experience. When you consider all these factors, it is no wonder that DXing is so popular even though we are at the bottom of the eleven year solar cycle in 2009 there are always rare DX stations around to be worked. As the propagation becomes better over the next few years HF DX will improve. When sunspot cycle number 24 peaks in a few years from now you will experience fabulous world-wide propagation. I am trying to provide tips and information in this section to help you succeed in DXing, whether you are a newcomer 10 DX or a DXing veteran. If you would like to find out more about DXing, contact me at leejen@paradise.net.nz and I will be happy to put you in touch with DXers in your area. You should also subscribe to the Yahoo Kiwi DX List reflector for up to the minute information.

The worst day DXing sure beats the best day working!

73, *Lee Jennings ZL2AL*

ZL DXCC

Reproduced courtesy Duncan McMahon ZL3JT

Call	Mix	Ph	CW	RTY	5BDXCC	160	80	40	30	20	17	15	12	10	6	2	De Soto
ZL1AA	129																
ZL1AAR		116															
ZL1ACZ	141																
ZL1AH	352																
ZL1ALD	103																
ZL1ALE **		349															
ZL1AMN **		350															
ZL1AMO **	**366**	**359**	341		Yes		#	#		#		#		#			
ZL1ANF	144																
ZL1ANH	301	290															
ZL1ANJ		301					103	115		267		237		213			

Call	Mix	Ph	CW	RTY	5BDXCC	160	80	40	30	20	17	15	12	10	6	2	De Soto
ZL1ARY	369	364															
ZL1AYZ		174															
ZL1BDQ	321				Yes		#	#		#		#		#			
ZL1BIV	104																
ZL1BJN		109															
ZL1BKX		340															
ZL1BLY			103														
ZL1BOQ		341			Yes		#	#		#		#		#			
ZL1BWK	321	321															
ZL1BYA	101																
ZL1BZT			105														
ZL1CYK	119																
ZL1HY	346	346			Yes		#	#		#		#		#			
ZL1KJ		251															
ZL1NI	107																
ZL1OK	250																
ZL1OGX		103															
ZL1SZ		313															
ZL1WG		337					119	161						156			
ZL2AAA	287	287								227	155	140		104			
ZL2ACP	328																
ZL2AFT		**354**															
ZL2AGY	#		#		Yes		#	#		#		#		#			
ZL2AJV		109															
ZL2AKI				149													
ZL2AL	336	325	309		Yes		202	204	162	315	105	210		142			1410
ZL2AMI				100													
ZL2AOH	112		101														
ZL2ASM	328																
ZL2AYZ	144	174		107													
ZL2BB			105														
ZL2BLC		323															
ZL2BNI		105															
ZL2BRB			261														
ZL2BRQ	204	193															
ZL2BRS		329															
ZL2CC	202	198															
ZL2CV	100																
ZL2GEO			104														
ZL2IFB	231		229				106	186	117	149	100	121					
ZL2JJ			226														
ZL2JON	182	108	111	126													
ZL2JR						131											
ZL2KA			100														
ZL2LE	231	231								161	130	109					
ZL2MM		115															
ZL2NBK		104															
ZL2RR		345	182														
ZL2RVW	192																
ZL2ST	342	310															
ZL2US		105															
ZL2UW	#	#			Yes		#	#		#		#		#			
ZL2VS	341																
ZL3AB	111													-			
ZL3CED	101																
ZL3DW	124	110								105							
ZL3GS	362	362															

Call	Mix	Ph	CW	RTY	5BDXCC	160	80	40	30	20	17	15	12	10	6	2	De Soto
ZL3IX						151											
ZL3JT	**340**	339	333	256	Yes		143	242	221	339	183	310		242			1806
ZL3JU	**341**	336						148		336		114					
ZL3NB	173		161					100									
ZL3NS		367															
ZL3NW	108	108						108									
ZL3PAH	106							100									
ZL3REX	123																
ZL3TY	121										#	#					
ZL4AS	302	291	210		Yes		#	#	130	#	124	#		#			1228
ZL4AW	329																
ZL4CR	160		125														
ZL4NR		107															
ZL4PN		198															
ZL4PW	293	241	264				125	197	179	275	199	146					1243
ZL4QJ		330						150		111							
ZL4SA		113															
ZL0AKH	109																

Number shaded indicates current Honour Roll, but totals include "deleted entities"

# indicates total not promulgated in DXCC lists

E&OE and silent keys not listed where known

Call signs and totals in **bold** indicate "Top of the Honour Roll" credited.

** Indicates Hall of Fame inductees

EMC - Electro Magnetic Compatibility

by Bob Vernall ZL2CA

EMC (electromagnetic compatibility) may sound as if it is a new topic, but it has been around ever since electrical applications were first developed. Radio and electronic applications need to take account of how one application could interact with another, and consider limits so that all applications could co-exist. In the case of amateur radio, the possible impacts of operating a transmitter are the most obvious situation to consider for compatibility, as the intended radio transmission will have high signal level at the antenna, and decaying in strength in radial directions. EMC can be regarded as having two parts:

- EMI, electromagnetic interference, where disturbance results from an emission, which could be from non-radio equipment such as a computer.
- EMS, electromagnetic susceptibility, where exposure to an intended radio transmission gives degraded performance to victim equipment such as an audio amplifier.

Should EMC problems arise then there is usually some sort of trade-off to consider by affected parties:

- Is the problem due to a transmission deficiency?
- Is the problem due to susceptibility (even with a "clean" radio emission)?
- What are the choices to solve the EMC problem?
- What are the costs of EMC treatment?

There should be very few, if any, circumstances where an amateur operator is forced to cease operation solely because of EMC difficulties. The end objective of clearing EMC problems should be to develop a practical result that is acceptable to all affected parties. There are advantages for amateur operators who are conversant with EMC causes and cures, as they can put their knowledge into practice should an EMC problem crop up with their station, or help others.

C-tick and product compliance in New Zealand

Electrical products for sale in New Zealand are regulated by "C-tick" compliance. Appliances with a C-tick should meet standards for control of RF emissions (even for apparatus that has no intended emission). While the C-tick arrangement is generally good for minimising "environmental RF fog", the compliance limits are mainly to protect broadcast service reception, which involves relatively strong wanted signal strengths, so compliance with C-tick may still be well above the noise floor of a sensitive amateur receiver with an antenna near the appliance in question. C-tick is silent on RF susceptibility.

EMC compliance in other countries

C-tick is basically an Australasian arrangement. FCC Part 15 Class B covers emissions for apparatus intended to be used in residential situations, and is very similar in emission limits to C-tick. FCC Part 15 Class A caters for industrial apparatus and has higher emission limits than Class B. The European CE standard includes emission and susceptibility testing, so has wider scope than C-tick. However, as for C-Tick, compliance with EMC standards in other countries is short of any blanket assurance that there could be no issues for amateur radio operation and weak signal reception.

Some Basic Physical Factors for Electric and Magnetic Fields

EMC is fundamentally to do with electric or magnetic energy interactions. It is generally desirable to keep one circuit sensibly isolated from another, but sometimes coupling may arise in unforeseen ways. Coupling could be by any or all of the basic mechanisms, namely:

- Conduction by electron currents flowing in physical conductors
- Induction by electric or magnetic flux linkages (reactive energy)
- Radiation by way of outgoing electro-magnetic fields (radiated energy)

Radiation is of course what communication by radio is all about. The EMC challenge is to carry out amateur radio activities with minimal unwanted interaction with other equipment or services.

In the vicinity of a transmitting antenna there are magnetic and electric energy fields that are a complex combination of

reactive (stored) and radiated (net outgoing) components. The specific reactive and radiated components depend on the type of antenna (different for monopole, dipole or loop). The strength of the near field falls away quite rapidly with increasing separation from an antenna (that is transmitting). Increasing the separation distance is always a winner for reducing EMC problems. Even with EMC problems inside the shack, like one piece of equipment placed adjacent to another, a modest shift can have a large impact.

When it comes to suppressing unwanted signals, it is usually best to work on finding the root cause and trying to stop the unwanted signal from travelling away from the source. While prevention is better than cure, if the unwanted signal can not be prevented from developing then the next strategy is to minimise the ways in which it may spread.

EMC countermeasures include the following techniques:

- Shielding (solid metal, even double screening)
- Bypassing (usually a suitable capacitor with low series resistance)
- Filtering (suitable series and shunt components)
- Suppression (usually within the equipment itself)

Note that many types of plastic equipment cases are transparent to RF and have useless shielding properties at the frequencies involved.

Filter applications

Filters are one of the basic electronic building blocks that can make the difference between communications being satisfactory or unsatisfactory. There are many types of filter, designed for many applications and for many source or load impedances. Refer to a radio handbook for details on filters. Proper use of filters is central to solving EMC problems.

A low pass filter in the antenna feeder can be a useful accessory for an amateur station, to give a confidence to operating and control of harmonics. When harmonics fall in television bands, the level should be low enough that the air path to a neighbour's receiving antenna has sufficient loss to not result in interference.

Be wary of the specifications of cutoff frequency for low pass filters made for HF operation. In Europe and the USA the lowest band edge for television is 54 MHz. In New Zealand television channel 1 has a lower band edge of 44 MHz. So a low pass filter designed to protect 54 MHz is going to be short of filtering at 44 MHz. It so happens that some USA manufactured low pass filters are designed to also cater for IF breakthrough for USA television receivers, so are designed to have good rejection upwards from 41 MHz, so these types of low pass filter are best for control of amateur band harmonics falling in New Zealand television channel 1.

Band pass filters can be useful for some amateur situations, such as for reducing strong non-amateur signals from getting into and overloading amateur receiver front ends. Field days or contests with multi-transmitter multi-band operation are examples where extra RF filtering is very useful.

Television receivers may have inadequate rejection of amateur HF frequencies. A useful countermeasure is to insert a high pass filter in the feeder to the television receiver.

The current trend with terrestrial television broadcasting is migration to digital modulation and only in the UHF band. This scenario is generally "easier" for amateur radio compatibility than is the case for analogue television receiving in VHF bands. Satellite television broadcasting involves receiving with very directional antennas and take-off angle well above the horizon, so is relatively immune from amateur radio operations.

Antenna Considerations

Antennas are the key to achieving overall effective performance of an amateur station. For nearly all types of antenna, the radiation efficiency and general effectiveness improve with antenna height above ground-level. The following factors can apply to high antennas:

- DX performance is usually better, on any band
- For receiving, gives some separation from local sources of QRM
- For transmitting, gives less exposure to ground level equipment or people
- Can run lower transmitter power and still sustain communications.

Ground-mounted vertical antennas have a reputation for having near fields (within a wavelength or so) that are "hotter" than those for other types of antennas. In a suburban situation, ground-mounted verticals have maximum radiation directly into nearby houses. The converse of what happens on transmit is that when on receive these ground-mounted verticals can easily receive neighbourhood QRM. While verticals can be effective for communication on the lower bands, they are unfortunately also potential candidates for EMC problems in built-up areas.

Best communication efficiency may be obtained by transmitting on the vertical and receiving on whatever antenna gives the best signal to QRM ratio of the desired amateur signal (the reciprocity theorem applies to wanted RF signals on the path, but practical communication also depends on levels of local QRM and that can be different for each station.

Horizontal centre-fed dipole antennas are inherently much more balanced in operation than ground mounted verticals. Dipoles have surrounding flux patterns that are similar in shape each side of the centre feedpoint. The actual balance of the near field of a dipole depends on the angle from which the dipole is "viewed". A dipole viewed "side-on" presents good balance but viewed "end-on" the near side of the dipole predominates over the far side. On transmit there are unavoidable high voltages (and high field strengths) around the dipole ends. This is also the case for any antenna with an "open end".

Loop antennas are inherently one of the most balanced of all antennas. Much of the near field flux is contained within the loop. A loop antenna has a more confined near field pattern than is the case with dipoles, so tends to do better for receiving in a QRM limited situation. Loop antennas are widely reported as being quieter on receive than other types of antennas, yet are still effective for weak signal reception. Similarly transmitting with a loop has more confined near field. A one wavelength circumference loop can also work on near multiples of wavelengths, and with a tuning unit it can be useful on most bands. A smaller sized frame loop antenna can be useful for reception, when sited in a low noise location and with orientation to make use of the nulls broadside to the frame to get best signal to QRM ratio.

Antennas can develop corrosion in connections, or fatigue breaks in some strands of a multistrand wire. A bad connection or intermittent touching in a fatigued wire not only impairs performance on receive, but can cause arcing when transmitting. Arcing generally results in broad band "click" interference and is obviously an undesirable situation. Even the best filtered transmitter in the country can cause EMC problems if there are bad connections in the antenna. Well-constructed and well-maintained antennas generally give least EMC problems. As always, antennas should be mounted "in the clear" for best communication results and least invitation for EMC problems where RF power couples into surrounding structures.

Transmitting antennas and feeders should be kept away from television antennas or downleads as otherwise it invites large levels of amateur band signals arriving at the television receiver front end. Reciprocally, and QRM from the television signal could couple to the amateur feeder.

Desirability of using a balun with a balanced type of antenna

Even if a balanced type of antenna is selected for use, the actual balance of the overall antenna system depends on how the feeder is connected. If the feeder is coaxial cable then using a **balun** (**balanced** to **un**balanced transformer) at the antenna feedpoint is one way of minimising RF current from flowing back down the outer of the coaxial cable rather than into the antenna proper. As well, a balun can minimise noise from travelling up the outer of the coaxial cable and making reception seem worse than it would be without the unwanted noise. Another technique for reducing the affect of the coaxial cable braid is to use an RF choke, typically by having a string of well-fitting ferrite toroids over the feeder. For making your own balun or choke, refer to an appropriate handbook for selection of core types.

Active Antennas

An active antenna can be useful for receiving, especially when there is local QRM. Active antennas can be physically very small in wavelength terms. Small size has a smaller near field zone. While a transmitting antenna usually has "full size" dimensions for radiation efficiency reasons, when used for receiving the larger size may be worse for pickup of local QRM. The main criteria for an effective active receiving antenna are that the delivered result has atmospheric noise (QRN) dominating over thermal noise (noise from the active antenna electronic devices). It is possible for a one metre whip with JFET input stage to be an effective active antenna over many bands, particularly lower bands where QRM can limit sensitivity. Siting the active antenna away from houses and power lines can often deliver a better signal to noise ratio of a wanted radio signal than for reception using a "transmitting" antenna.

An active antenna can be broadband. Frame loops can also be used as active antennas, but usually need to be tuned. A fairly long feeder is possible as the headend can incorporate enough active gain to compensate for some line loss. A multiwire cable is needed if power supply, tuning voltages and band switching control all need to be fed from the shack. If the power supply is mains powered, it needs to be carefully designed to resist breakthrough of mains-born noise. Obviously the active antenna electronics need to be designed for good linearity (low intermodulation) and survival from exposure to high signals (on-site transmission from another antenna). Great care should be taken with feeder connection so as to not inadvertently transmit into an active antenna; as such an experience usually renders it inactive until repaired. Transceivers with separately accessible receive only input are ideal for connecting to an active antenna, and not exposing receive only equipment to risk of a "bite" by inadvertent connection to a transmitter output.

Commercially Manufactured Transceivers

These days there are a great many commercially manufactured transceivers used by amateur radio operators. While it is a shame that home construction is less popular than in yesteryear, it should not be overlooked that the commercial "appliances" bring with them a reasonably high standard of performance in terms of suppression of harmonics and other types of unwanted emissions. Nearly all commercial transceivers include a good modulating stage, good signal filtering and a reasonably designed power output stage. In some countries there are regulatory requirements for limiting unwanted emissions, so commercial transceivers need to be designed for sufficient suppression of unwanted emissions if they are to qualify for marketing in those countries. The general result is that "big name" manufacturers tend to have good pedigree for EMC, as they seek international sales potential for their products.

Power supply considerations

The humble power supply should not be overlooked as a possible EMC situation. For example, on-site hum modulation can occur when RF gets into rectifier diodes. The resulting hum modulated signal then escapes by the reverse path of how it entered the power supply. Regulated power supply action may malfunction should RF be conducted into the circuit via AC or DC power leads. General treatment for HF EMC problems is to use 0.01 uF disc ceramic capacitors to "bypass" all leads and semiconductors, but of course they should be checked for not slowing down the response of electronic voltage regulators being able to follow variations in current drawn from the supply. VHF EMC problems should be treated with lower value "bypass" capacitors, or even metal shields. Do not skimp on safety ratings with capacitors used on mains leads (if a capacitor is not marked as being 230 volts AC mains rated, then do not use it on mains wiring). Winding AC or DC leads on ferrite toroids can also be effective at reducing RF getting into a power supply or into equipment connected to the power supply.

Hum loops can be a problem when several separate pieces of equipment are connected up, as the grounded conductors in connecting leads provide a mesh of paths in which earth return current is able to flow. Power supply currents sharing conductors with low level audio signals is a recipe for coupling unwanted hum and noise to the audio feed. A very effective way of controlling power supply hum loops is by using split bobbin power transformers and two wire mains leads. A **split bobbin** transformer with a double insulated rating is legally able to be used with no earth wire, thus a potential hum loop via the mains earth is entirely avoided. For safety reasons this is **not** a technique to try with other than the proper rated split bobbin type of transformer. An isolation transformer in series with an existing power cord can be used with equipment that does not have a split bobbin transformer in its power supply, or as a way of testing where a hum loop arises. Isolation transformers have highest isolation at lower frequencies, and are limited by primary to secondary coupling capacitance in restraining higher frequencies from "jumping" the windings.

Switch mode power supplies may give high efficiencies and small package size, but there are inevitably "hash problems" for switching related QRM over several bands. One innovation in a commercial switch mode power supply for radio gear is to have a front panel "tuning knob" so the switching rate can be optimised for minimal interference falling on a given working frequency (and needs re-adjusting as appropriate). Having a tuning knob does nothing to reduce the generation of hash or harmonics but instead arranges for them to be steered to least harmful spots on the dial.

For "wall wart" supplies (small power supply integrated with the plug) a lightweight one is likely to be switch mode and can generate broadband hash, whereas older types with iron-cored transformers are more likely to be neutral from an RF point of view. If swapping of a switch mode for iron-cored "wall wart" is contemplated, bear in mind that regulated output may be needed, and that most iron-cored wall warts have unregulated output.

Limitations Of Inductors

High frequency inductors are sometimes rated by the manufacturer for operation over a specified frequency range. This is a realistic reflection that unavoidable inter-winding capacitance results in self-resonance at some relatively high frequency, and also for losses in core or coil former material. For frequencies above self-resonance the "inductor" appears to behave more like a capacitor, and explains why some filters may not deliver the expected results at higher frequencies. What is intended on a circuit diagram and what happens to an installed inductor may not achieve the intended result. Inductors need to be carefully selected if wideband performance is sought.

Limitations Of Capacitors

Capacitors also become self-resonant at some high frequency, when resonance occurs with unavoidable inductance of the leads and body. All lengths of conductor have some inductance, so it is impossible to build a perfect capacitor that would work at any frequency. However, capacitors are generally useful over a much wider frequency range than is the case for inductors. Disc ceramic capacitors are generally the best all round performers for HF and VHF work. Surface mount capacitors have the shortest possible leads, but performance still needs to account for printed circuit track length. The rated upper frequency range of mains bypass capacitors is sometimes no more than a few megahertz. Polystyrene or polypropylene capacitors are generally the lowest loss type of capacitor in the audio and lower frequency bands.

Ferrite and Powdered Iron Components

There are many types of ferrite and powdered iron cores, and care is needed to select an appropriate type for a given application. There is quite a difference between selecting a core for a low loss RF transformer and using a core to attenuate unwanted RF signals. Transformer cores working at signal frequencies generally require selection of a given type of core material that has low loss in the frequency bands of interest, especially where RF power is involved (a lossy core will soon be "cooked" and could have permanent deterioration of core parameters). For EMC applications ferrite material is generally selected for loss at frequencies that are much higher than for those when it would alternatively be used as a transformer core. Low Q absorptive mode of operation usually gives best EMC performance than reactive choking (reflects rather than absorbs QRM). A low Q choke is like having an inductively coupled series resistor in the circuit.

Split-core ferrites can easily be fitted over existing wiring, and can effectively add a series impedance to higher frequency signals in the wiring. Split-core ferrites are widely used commercially, for the likes of reducing radiated noise from computer cables (especially in the VHF broadcast bands). The split core (when fitted properly over a wire or cable) is equivalent to a one turn inductor with a toroid core, so not unexpectedly has fairly low impedance at lower frequencies, so does little to reduce conducted noise that happens to fall in the 160 or 80 metre amateur bands. Several turns on a high permeability core are needed for there to be useful attenuation in the MF and lower HF bands. Low band chokes can be made from U or E cores salvaged from scrapped switch mode power supplies. Highest choking is obtained with no shims and no air gap for U or E core mating faces.

Powdered iron cores have less permeability than ferrite but are generally superior for linear performance at transmitter output power level. Powdered iron cores are widely used for inductors in transmitter output filters, and most of these are in toroid (ring) form. Toroid cores are ideal for keeping most of the magnetic flux within a closed path (around the toroid) which not only leads to fewer turns for a required value of inductance but also minimises the flux that possibly links with other circuits.

Cores need to be selected for frequency range and whether it is for transmission or suppression.

For transmission applications, core size needs to be selected for power handling (with operation well away from saturation limits).

Telephones

Older technology telephones have passive components and have good immunity to RF exposure. Newer types of electronic telephone have ICs and semiconductor junctions that can demodulate even moderate levels of RF. It is difficult to offer useful EMC advice on selections of telephones for private ownership, as there are so many types of telephones in use, with new ones appearing, and marketing for low cost likely cuts corners in the specific area of RF immunity. An easy to try solution is a DSL filter inserted inline with the telephone that suffers RF interference. DSL filters are designed to separate off voice baseband by low pass filtering, and this can be useful for reducing RF pickup even if there is no DSL service on a given line (it does not matter if the DSL output socket is unoccupied, the low pass part of the filter can be used for non-DSL applications like keeping RF out of any telephone).

Controlling RF Pickup In Audio Amplifiers

The input stages of audio amplifiers can act as crystal sets and detect RF that happens to arrive with good level at the input device. The detected parts of the RF envelope that are in the audio range can thus be amplified by subsequent audio stages. A useful way of reducing RF arriving at the first audio stage is to use an RC low pass filter (a series resistor followed by a parallel capacitor to equipment chassis or PCB earth). A resistor of a few hundred ohms (but could be as much as 10% of the amplifier input resistance) and a capacitor of a few hundred picofarads (but with a reactance that does not significantly reduce the level of the highest audio frequencies) can be very effective at controlling RF breakthrough. A suitable value series resistor is considered to be a more consistent performer than an RF choke (RFC). This is because the resistor retains its effectiveness over a very wide bandwidth, whereas the RFC may offer too little reactance to be effective at lower frequencies and become self-resonant below the desired upper frequency limit of operation.

Speaker leads also act as unintended aerials. RF pickup in the amplifier can be reduced by winding the speaker leads on a ferrite rod or ferrite toroid (this of course uses up some of the length of the speaker lead).

Computers and amateur radio

Many amateur operators use a computer in the shack. The computer motherboard involves a myriad of high speed digital signals for clocking and data processing, so there is usually very high potential for interference to be experienced by a nearby radio receiver. The power cord, keyboard cable, printer cable, mouse cable, monitor cable and COM or USB cables are also possible ways that "computer hash" can escape. A CRT monitor can produce magnetic deflection fields for quite a distance from the monitor. Wide bandwidth video drive signals may also be noticed on nearby radio receivers. Nearly all computers and monitors use switchmode power supplies, which can also be "hash generators" from a radio perspective. Commercial leads with integral ferrite sleeves are likely optimised to reduce emissions in the VHF broadcast bands, so may have only moderate attenuation for lower amateur bands. Don't take for granted that a ferrite sleeve is good at attenuating QRM at lower bands, and if cords are long enough then better results could be had by winding multiple turns in a high permeability core (like E or U cores, check for no shims).

Before purchasing a computer, look for labels indicating FCC or CE compliance with EMC standards. Taming interference within a computer would be beyond the scope of any warranty offered on a computer, and also be a difficult challenge. Having a portable radio with frequency coverage on bands of interest is one way of evaluating relative interference in a shop situation.

Monitoring with AM mode is much more informative than receiving on any other mode. Having an analogue S meter is useful for comparing levels. Some computers are quite acceptable for running in the shack alongside radio equipment. However, a "bad" computer can be an irritation for amateur radio operation.

Some switched mode power supplies have only token RF filtering and these can be quite bad for causing local interference. Fitting an external mains filter is generally not as effective as having the filtering components inside the power supply. One way of improving on a computer power supply causing QRM is to swap out the power supply module for one that is claimed to have good RF filtering, and is also electrically compatible for socket pinout and voltages (AT, ATX, etc).

For radio data modes such as RTTY, packet, Amtor or Pactor, it is easy to for mains hum (and related power supply buzz from mains harmonics) to contaminate audio feeds. The solution is to use audio isolation transformers as these are like "braid-breakers" in preventing earth loop paths. Telephone style isolation transformers (can be salvaged from a scrapped dial-up modem) are ideal for using in a radio interface unit, as they have relatively high voltage isolation specifications. PTT control can be implemented with a suitable opto-isolator (a cunning way of providing the equivalent of a contact closure). Having a means of adjusting audio level is also handy, as computers can generate volts of audio drive and microphone inputs can easily be overloaded.

A lap top PC can have a very low level of overall radio noise. LCD displays are lower energy than cathode ray tubes, and lap top PCs generally have compact and well-shielded modular construction. In some cases an external switch mode power supply can be the worst interference generator in a laptop PC setup. An external power supply can be replaced by a low noise linear regulated power supply with the same DC output. Having the Internet available on a shack PC can be useful, and a WiFi feed is a "wireless workaround" to running data cables and risk of data QRM.

AREC – AMATEUR RADIO EMERGENCY COMMUNICATIONS

MISSION STATEMENT

To be the preferred provider of emergency communications to New Zealand Emergency Services.

The AREC was formed in 1932 following a devastating earthquake in Napier. Today, the AREC consists of 74 Sections throughout New Zealand, each with its own Section Leader who is responsible for the training and conduct of the Section. Each Section is attached to a Branch or Branches of NZART, from where members are drawn.

Management of the AREC is vested in a National Director who is appointed by NZART Council. The National Director likewise appoints a Deputy, Secretary, Training Officer and Managers for the four districts. These eight people form the AREC Management Group.

The current objectives are:

- To train and provide communications personnel, skilled in assisting organisations during emergencies.
- Maintain a close liaison with the New Zealand Police for Search and Rescue.
- Maintain a close liaison with Civil Defence.
- Maintain a liaison with community organizations.
- Provide and maintain equipment appropriate for emergency operations.

National Director AREC controls the issue of AREC Station Identifiers, formally known as "E" call-signs. AREC Sections are listed in this publication, in identifier order, along with their Section Leaders and Deputies. The Section Identifier, in its basic two letter form, is issued to the Sections' Leaders for their use only. AREC Station Identifiers for Section use are then issued by the Section Leader for that operation/exercise, with the following being normally reserved:

"A" = Section Base Station
"X" = Established Relay Stations
"Z" = District Control Stations

AREC operators engaged in SAR activities and operating on SAR frequencies are to use the call-sign allocated for that operation/exercise. This call-sign is to reflect the geographical location (nearest town) of the search area. Civil Defence's radio call-signs are controlled by the CD organization.

AREC emergency frequencies

The following frequencies are reserved for AREC use in emergencies:

1875–1900 kHz
3500 and 3900 kHz
7100 kHz

2 m and 70 cm repeaters
The general calling frequencies for AREC stations requiring assistance in emergencies are, 3900 kHz USB or local repeaters and these frequencies are normally monitored by AREC personnel during events such as storms, earthquakes and other significant events that could give rise to emergencies.

AREC Sections' Net

A monthly net is held on 3900 kHz USB at 1930 hours NZST or at 2030 hours NZDT on the third Monday of each month except December. This net uses the AREC Identifier of **ZK6E**, the AREC master station and is conducted as a contact net for those Sections wishing to seek information or report activities of an AREC nature.

Be prepared for an emergency – What to do – Some suggestions

As an Amateur Radio Operator, who may become involved with an emergency of some kind and having access to assistance via radio could provide timely intervention to those in distress. Preparations for such an eventuality would be good planning and the following suggestions are offered.

1 Be familiar with your local repeater services and frequencies, with a knowledge of the service area.
2 In the event of an SAR requirement, contact your nearest Police station, they will activate their system.
3 For Civil Defence requirements, contact either your Regional or District Councils.
4 Be familiar with your AREC representatives or Club officials, keep a list in the house and car.
5 Use the AREC call frequencies or break-in on any net and identify yourself and the emergency at hand.

When making a call for assistance, by radio, ensure that all the vital details concerning the emergency are passed to the station that is contact the emergency services, this will enable a more appropriate response.

Police, Fire, Ambulance check list

Type of incident
Road accident—type and number of vehicles involved.
—Number and extent of injured or trapped persons.
Type of medical emergency—heart attack, electrocution, etc.
What is on fire—car, building, stove, etc.
Kind of accident—car/truck, car/person, motorcyclist etc.
Hazardous chemicals involved—gases, liquids, fuel, etc.
Location of accident
Street or road name and number, rural number, highway number.
Cross street or road reference.
Suburb and city or town.
Any other geographical detail to clarify location.
Other information
Vehicle registration number—burglar, hit and run, etc.
Description of people—clothing, height, race.
Direction of travel.
(If you are making a telephone call to the emergency services, make sure the above information is gained from the person on the radio before making the 111 call.)

Marine distress call

Intercepting a "MAYDAY" call, briefly listen to see if any other station is responding, then endeavour to contact the distressed vessel on the frequency and mode they are using. Do not get them to change frequency. Ask for details of the distress and write down the details given.

Essential information

Where Position, latitude and longitude, GPS information, any bearing and distance from geographical feature or place.
What What is the nature of the distress?
What help is required?
What battery life or restrictions are on radio use?
What lifesaving equipment is on the vessel?
Has an EPIRB been activated?
What is the weather at the distress position?
Who
Description of distressed vessel, name, registration and size.
How many people in distress and their ages.
Colour of vessel and distinguishing marks.
Also record the time and frequency of the distress call. If practical get another person to telephone in the information and stay on the frequency to gather other essential information. Tell the operator what assistance you are giving to help them.

Desirable information

Voyage details
Departed time, date, destination.
Last known exact fix, if position unsure.
Medical details
Any specific medical needs or conditions?
Extent of injuries.
Safety equipment
Food and water available.
Other types of radio equipment, VHF, HF.
Flares and types available.
The station called Mayday, in fact, might not hear you calling because of propagation or other factors, but continue to listen, they could transmit their position details blindly. Regardless, report the distress call to the coast guard or Taupo Marine Radio stating the time and frequency, when first heard and any other details of the signal, background noises or how genuine it sounds.

Earthquake

In the event of a moderate or greater earthquake felt in your location, your assistance, through AREC, could be valuable to Civil Defence. Switch to your local VHF repeater and monitor for activity about the event. An AREC station may be requesting reports from stations on what has occurred in their locality. AREC will be gathering this information to put together a "Felt Report" (refer to Earthquake Reporting). This information is then relayed to Civil Defence to help them access the extent of damage that may have resulted.
Apart from estimating the intensity of the earthquake, any information about the state of the utility services and any other significant details known about your surroundings will be useful.

EARTHQUAKE REPORTING

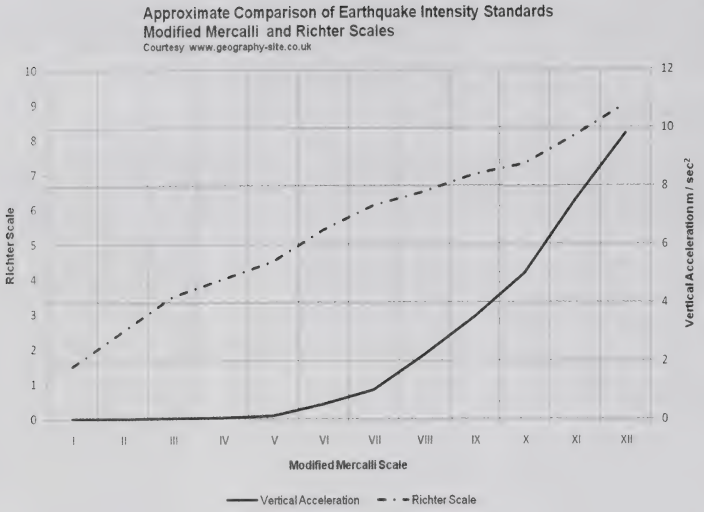
THE MODIFIED MERCALLI SCALE OF INTENSITY OF EARTHQUAKES

Introduction

The severity of an earthquake can be expressed in two terms, namely intensity and magnitude. These two terms are different and are often confused.
Intensity is based on the effects of ground shaking on people, buildings, contents and natural surroundings and varies from place to place within the disturbed region. This observed effect depends on the location of the observer with respect to the earthquake epicentre (location within the earth's crust where the movement occurred).
Magnitude is related to the amount of seismic energy released at the hypocentre (point on the earth's surface directly above the earth movement). This measurement is made by and recorded on instruments (Seismograph) that have a common calibration, thus magnitude is determined instrumentally and uses the Richter Scale to indicate the magnitude. The Richter Scale bears little resemblance to how people perceive the intensity of an earthquake, thus the "Modified Mercalli Scale of Intensity" is measurable by people.
This scale is based on certain key responses being felt or observed by people who can then grade the intensity using this scale, and communicate this to others. When reporting an earthquake you should use this scale to convey the effects that had been felt in your location. When a number of reports are collected from an area and assembled in one place, a summary of this information then becomes known as a Felt Report (indicating the extent of the area it was felt over and what intensities were experienced).

Modified Mercalli Scale of Intensity

MM1 Not felt by humans, except in especially favourable circumstances, but birds and animals may be disturbed. Reported mainly from upper floors of buildings more than 10 storeys high. Tree branches, chandeliers, doors and other suspended systems of long natural period may be seen to move slowly. Water in ponds, lakes, reservoirs etc may be set into seiche oscillation.
MM2 Felt by people at rest


Approximate Comparison of Earthquake Intensity Standards
Modified Mercalli and Richter Scales
Courtesy www.geography-site.co.uk
Richter Scale
Vertical Acceleration m / sec²
Modified Mercalli Scale
I II III IV V VI VII VIII IX X XI XII
Vertical Acceleration
Richter Scale

indoors, especially by those on upper floors or otherwise favourably placed. The long period effects listed in MM1 may be more noticeable.

MM3 Felt indoors, but not immediately identified as an earthquake by most Vibrations may be likened to the passing of a truck. It may be possible to estimate the duration, but not the direction. Hanging objects may swing slightly.

MM4 Generally noticed indoors, but rarely outdoors. Light sleepers may be awakened. Vibrations may be likened to passing heavy traffic, or to the jolt of a heavy object falling or striking the building. Walls and frame of building are heard to creak. Doors and windows rattle, liquids in open vessels may be slightly disturbed. Standing motor cars may rock, and the shock can be felt by their occupants.

MM5 Generally felt outside, and by most indoors. Most sleepers awakened. A few people frightened. Direction and motion can be estimated. Small unstable objects may be displaced or upset. Some glasses and crockery may be broken. Some large windows cracked/damaged. Hanging pictures move. Doors and shutters may swing. Pendulum clocks are affected.

MM6 Felt by all. People and animals alarmed. Many run outside. Difficulty experienced in walking steadily. Slight damage to masonry "D". Some plaster cracks or falls. Isolated cases of chimney damage. Windows, glassware and crockery broken. Object fall from shelves, pictures from walls. Heavy furniture moved. Unstable furniture overturned. Small church and school bells ring. Trees and bushes shake, or are heard to rustle. Loose material may be dislodged from existing slips, talus slopes or shingle slides.

MM7 General alarm of people and animals. Difficulty experienced in standing. Noticed by drivers of motorcars. Trees and bushes strongly shaken. Large bells right. Masonry "D" cracked and damaged. A few instances of damage to masonry "C". Loose brick and tiles dislodged. Unbraced parapets and architectural ornaments may fall. Stone walls cracked, weak chimneys broken, usually at the roof line. Domestic water tanks burst. Waves seen on ponds and lakes. Water made turbid by stirred up mud. Small slips, caving in of sand and gravel banks.

MM8 Alarm may approach panic. Steering of motorcars affected. Masonry "C" damaged with partial collapse. Masonry "B" damaged in some cases. Chimneys, factory stacks, monuments, towers and elevated tanks twisted or collapsed. Panel walls thrown out of frame structure. Some brick veneers damaged. Decayed wooden piles broken. Frame houses not secured to foundations may move. Cracks appear on steep slopes and in wet ground. Landslips in roadside cuttings and unsupported excavations. Some tree branches may be broken off. Changes in the flow or temperature of springs and wells may occur. Small earthquake fountains (fissures).

MM9 General panic. Masonry "D" destroyed, masonry "C" heavily damaged, sometimes collapsing completely, masonry "B" seriously damaged. Frame structures raked and distorted. Damage to foundations generally. Frame houses not secured to foundations shifted off. Brick veneers fall and expose frames. Cracking of ground conspicuous. Minor damage to paths and roadways. Sand and mud ejected in elevated areas, with the formation of fissures and sand craters. Underground pipes broken. Serious damage to reservoirs.

MM10 Widespread panic. Most masonry structures destroyed, together with their foundations. Some well-built buildings and bridges damaged. Dams, dykes and embankments seriously damaged. Railway lines slightly bent. Concrete and asphalt roads and pavements badly cracked or thrown into waves. Large landslides on river banks and steep coats. Sand and mud on beaches and flat land moved horizontally. Large and spectacular sand and mud fissures. Water from rivers, lakes and canals thrown up on banks.

MM11 Wooden frame structures destroyed. Great damage to railway lines and underground pipes.

MM12 Damage virtually total. Practically all works of construction destroyed or greatly damaged. Large rock masses displaced. Line of sight and level distorted. Visual wave motion of the ground surface reported. Objects thrown upward into the air.

Masonry categories

"A" Structures designed to resist lateral forces of about 0.1g that satisfy the New Zealand building code 1955. Typically, well reinforced ferro-concrete. All mortar is in good condition and the design and workmanship is good. Few buildings erected prior to 1955 can be regarded as category A.

"B" Reinforced buildings of good workmanship and with sound mortar, but not designed in detail to resist lateral forces.

"C" Buildings of ordinary workmanship, with mortar of average quality. No extreme weakness, but neither designed nor reinforced to resist later forces.

"D" Buildings of low standards of workmanship, poor mortar or constructed of weak materials like mud brick and rammed earth. Weak horizontally.

THE R-S-T SYSTEM

Readability

1—Unreadable.
2—Barely readable, some words distinguishable.
3—Readable with considerable difficulty.
4—Readable with practically no difficulty.
5—Perfectly readable.

Signal Strength

1—Faint signals barely perceptible.
2—Very weak signals.
3—Weak signals.
4—Fair signals.
5—Fairly good signals.
6—Good signals.
7—Moderately strong signals.
8—Strong signals
9—Extremely strong signals.

Tone

1—Harsh, broad hiss, no perceptible tone.
2—Harsh, broad hiss, just perceptible tone.
3—Harsh, broad non-sinusoidal tone.
4—Harsh, broad tone, badly hum-modulated.
5—Poor sinewave, badly hum-modulated.
6—Good sinewave, pronounced hum modulation.
7—Good sinewave, definite hum modulation.
8—Excellent sinewave, just perceptible hum modulation.
9—Perfect sinewave.

The "tone" scale is used for reporting the amount of hum on a CW signal. If the signal has chirp, the letter "C" can be appended. If the signal has key-clicks, the letter "K" can be appended. Most of the signals you hear will be T9.

Digital Modes are a facet of the hobby of great interest to some Amateurs, but remain an unexplored and misunderstood world to others, who perhaps expect it to be difficult and expensive to get involved, requiring extensive computer skills, and lacking in interesting live contacts with other Amateurs. This is however not true at all. Use of Digital Modes, particularly HF Digital Modes, for real-time contacts, has grown tremendously. Some of the modes developed in the last 10 years or so are now extremely popular for working DX, while other modes have advantages when working locals when conditions are poor- no need to suffer those static crashes. With low solar activity at present, Digital Modes take on a new importance, allowing QSOs to continue despite poor conditions.

VHF and UHF operation is mostly limited to packet operation, typically APRS (Automatic Position Reporting System). Bulletin board and message forwarding by radio has now largely been replaced by the internet. A new very high speed data and digital voice system called D*Star is beginning to be explored in some areas. There is also some interest in VHF SSTV, PSK-31, Hellschreiber, specialized Meteor Scatter, Aurora and moon-bounce modes, which offer considerable promise. Influenced by the internet, VHF packet activity has dropped markedly in recent years, but the HF digital "chat" modes are more popular than ever.

Digital modes make use of some type of keying or modulation to send data as "0"s and "1"s. For example, RTTY uses Frequency Shift Keying (FSK), sending "0"s on one frequency, and "1"s on another, with the elements arranged as five sequential data bits per character along with others for synchronizing the receiver. Morse and Hellschreiber send dots as carrier, and gaps between dots as no carrier. PSK31 sends "0"s and "1"s by switching the carrier phase, which you can imagine is the same as interchanging the leads to the antenna at the data rate. New chat modes such as DominoEX offer a considerable performance enhancement for VHF as well as HF.

Most digital modes use a coding system, which means that the letters and numbers (or even voice sounds or picture colours) are represented by numbers, which are transmitted as "0"s and "1"s. This improves the efficiency, but reduces the resistance to errors. RTTY (which uses the CCITT International Alphabet ITA2), PSK-31 (which uses the G3PLX Varicode), Pactor (which uses ASCII, also known as ITA5) and digital voice (for example DRM, which uses a compression algorithm) are examples of coded modes. FAX, SSTV, and Hellschreiber are examples of uncoded modes.

Many of the newer modes use an error correction system to ensure that the data arrives intact despite problems in the propagation path. This error correction takes one of two forms: Automatic ReQuest repeat (ARQ) or Forward Error Correction (FEC). These techniques have different merits, so some modes use a combination of FEC and ARQ.

ARQ requires a two-directional link, where each "packet" or block of data received is checked for errors and a request for repeat transmitted back if necessary. These modes are characterised by alternate transmissions from each end of the link; they are not suited to broadcast or net operation, and can be difficult to monitor, because you have no opportunity to receive corrections, and may get multiple transmissions when one of the linked stations has data to repeat. Pactor, Digital SSTV, RFSM8000 (Mil Std 188-110B) and VHF Packet use ARQ techniques. Provided conditions are good enough for the link to operate, the data transmitted via ARQ will always be perfectly received-eventually. When conditions are poor, throughput drops off dramatically.

There are several types of FEC, using a simple systematic repetition, complex mathematical algorithms or massive redundancy. FEC has the advantage that the information required to reconstruct the data accurately is transmitted along with the data, so is available to all receivers, while the data rate is constant, and no repeats are required. This is better for net operation. Some FEC types are extremely robust, but no FEC system can alone provide guaranteed perfect copy. Another disadvantage of FEC is that there is some coding delay at the transmitter, and decoding delay at the receiver; as a result, there can be unacceptable delays before print appears at the receiver. MFSK16, MT63, Olivia, the weak signal mode MEPT_JT and the new THOR mode are examples of FEC modes.

Uncoded modes do not need or use error correction, as they are generally robust by nature; in other words an error is seen as a blemish, rather than a completely different image, character or sound. These modes rely on powerful human pattern recognition ability for reception. Uncoded modes have an elegant simplicity and are generally characterized by the ability to send "overs" as short as just one character. The classic examples are the uncoded Morse and Hellschreiber, but some coded modes such as DominoEX are also sufficiently robust to not require error correction.

Digital mode software

Most of the Digital Modes discussed here can be operated with nothing more than a PC with a sound card, with very high performance. The sound card is used to send and receive audio tones which are used with an SSB transceiver. Reference(1) is arguably the best available guide to PC Digital Modes. A Guide to Sound Card Digital Modes with links to the software is also available on the Call Book CD, along with a presentation on HF Digital Modes.(2) The best way to locate the software mentioned in this review is via an Internet search engine, as web sites change frequently.

Other modes, such as Pactor and VHF packet, typically require an external module: either a modem or a modem and controller combination. There are now programs which emulate the modem and controller in software using the sound card.

Baud, bps and wpm

The symbol rate (baud) of a digital transmission is the rate in Hz at which the most basic data symbols are switched on the transmitted signal. For example, Amateur RTTY operates at 45.45 baud. The bit rate, in Bits Per Second (bps), is the actual data rate entering or leaving the modem (or sound card emulating a modem). For various reasons (compression, use of multiple carriers etc.) the bit rate may well exceed the baud rate. For example, MT63 has 64 carriers, and achieves 640 bps at only 10 baud.

The text transmission rate or typing speed in Words Per Minute (wpm) depends on how many bits there are per character (there are on average six characters in each English word, including a word space). As examples, 45.45 baud RTTY is 45.45 bps, and since there are 7.5 bits per character, RTTY operates at 6 characters/sec or 60 wpm. PSK-31 operates at 31.25 baud and achieves about 50 wpm. DominoEX11, an MFSK mode, operates at only 10.7666 baud using 18 tones, and yet achieves about 62 wpm. Feld-Hell operates at 122.5 baud, uses up to 49 bits per character, and is capable of about 25 wpm.

The use of FEC also influences the relationship between raw bit rate and typing speed, always slowing the typing speed compared with operating without FEC. This difference is called the FEC rate. To use the previous example, MT63 operates at 640 bps, but achieves only 100 wpm due to heavy FEC with a rate of 0.1.

Techniques which vary the size of each character (for example variable sized codes, "varicodes", or proportional fonts) can speed up the text speed for a given baud rate, and the actual speed then depends on context, just as it does in speech.

Bandwidth and speed efficiency

It is important to realize that some modes use much more bandwidth than others, often (but not always) in order to provide some other advantage. For example, compare PSK31 (bandwidth 50 Hz, speed 50 wpm) with MT63-500 (bandwidth 500 Hz, speed 50 wpm). MT63 uses much more bandwidth, and is less sensitive, but because it transmits much redundant information using FEC, is much more difficult to jam.

Some modes are poorly designed, having inappropriate modems, or use excessive bandwidth with no compensating advantages. Modes to avoid in this respect include HF packet, Olivia and RTTY (on lower HF). Other modes use too little bandwidth, or an unfortunate choice of keying rate, and so suffer from various ionospheric distortion problems. Some modes have very heavy FEC and other coding which considerably reduces the typing speed. For example Olivia operates at only 23 wpm, despite wide bandwidth, and has excessive delay. Most of the modes described below are well designed to have appropriate bandwidth and good efficiency. Advantages and any deficiencies are highlighted.

RTTY

The first digital mode to see widespread use in Amateur circles (after Morse, that is),

RTTY (Radio TeleTYpe) is a conversational or "chat" mode, and uses the ITA2 code to send a limited text alphabet, using frequency shift keying. Two tones are used, 170 Hz apart for Amateur applications. The transmission is about 450 Hz wide. Most Amateur operation is at 45.45 baud, while commercial services tend to be 50 or 75 baud. RTTY was designed for land-line use with mechanical machines, was never intended for DX radio operation, and suffers badly from multi-path effects. One lightning crash can cause a whole line of text to print in error.

RTTY still has a modest following, especially among mechanical machine enthusiasts, and it is still used for some contests. Perhaps the nicest sound card RTTY programs are TrueTTY by Sergei UA9OSV and MMTTY by Mako JE3HHT. Both have excellent tuning indicators and all the features one needs for simple yet slick conversations and even contests. MMTTY is more complex, but more versatile. MIXW by Nick UT2UZ and Denis UU9JDR is an excellent multi-mode alternative. For LINUX, OS-X, FreeBSD or Windows, the new free multi-mode program FLDIGI by Dave W1HKJ is highly recommended.

PSK-31

PSK-31 was developed by Peter Martinez G3PLX as an RTTY replacement, and was the first Amateur "designer" mode. It is a slick keyboard "chat" mode, but is much more sensitive and robust than RTTY, and uses less bandwidth than almost any other mode. PSK-31 uses differential phase shift keying (BPSK or QPSK). Just one tone is used. In BPSK mode the data is transmitted without error correction, while in QPSK mode each symbol represents two bits, allowing an FEC error correction technique to operate. The bandwidth is a mere 60 Hz. On HF, the error correction is disappointing, and PSK-31 is generally operated on HF without error correction.

PSK-31 is very popular, is still the most popular digital mode, and has proved to be excellent for HF and VHF DX, despite reception errors. It is not well suited to trans-polar or trans-equatorial paths (such as long path to Europe) or short F-layer paths, as it is susceptible to ionospheric flutter due to the narrow bandwidth. It copes well with adjacent signals, fading and multi-path reception, and it is not unusual to work stations you can barely hear, even with several others in the receiver passband. Tuning is easy because even weak signals can be seen on the software tuning display.

Because of the sensitivity, low power is all that is needed. There is a wide range of PC software for PSK-31. A good program to get started with is DIGIPAN, conceived by Skip K6TY for use with QRP "PSK Warblers", dedicated crystal controlled PSK transceivers. MIXW and MultiPSK by Patrick F6CTE are also popular, FLDIGI by Dave W1HKJ is an excellent choice for all popular operating systems.

MFSK16

Developed by Murray ZL1BPU specifically for Long Path DX, MFSK16 has a most unusual and recognisable musical sound. It uses 16 tones, transmitted one at a time at 15.625 baud. It is significantly better for polar and long path DX than PSK31, as it is immune to polar Doppler effects, and has high multi-path resistance. It is also a very sensitive mode, and has also been found very effective for 80 m DX. The only trouble is that the tuning requirements are quite tough-the receiver needs to be within 4 Hz of the right frequency to receive, and drift must be less than 4 Hz per over. Since most modern transceivers easily meet these requirements, MFSK16 is quite popular for DX and regular rag chewing.

MFSK utilises special DSP techniques to enhance the performance and avoid ionospheric difficulties. With multiple tones, it is possible to achieve sensitivity not possible with RTTY, and also transmit more data per tone (four bits) than a two-tone or PSK system (one bit). This allows the baud rate to be reduced to counter multi-path effects, which are baud rate dependent. MFSK16 has strong Forward Error Correction, and achieves a typing speed of 40 wpm in a bandwidth of 315 Hz. Many programs are available for MFSK16. The original STREAM by Nino IZ8BLY is highly recommended, as is MIXW, by Nick UT2UZ and Denis UU9JDR, and MultiPSK by Patrick F6CTE. FLDIGI by Dave W1HKJ has versions for Windows, LINUX, OS-X and FreeBSD. All four of these multi-mode programs also offer a narrow-band picture transmission mode controlled by MFSK16.

DominoEX

This new mode was developed to provide high performance under Near Vertical Incidence Signals (NVIS) conditions, such as those on 80 m at night. This type of propagation is characterized by high angle F-layer refraction from the ionosphere, with deep fading and severe propagation delays. Most digital modes do not work at all well under these conditions. The mode was also intended to be as good as MFSK16 under DX operating conditions, and should be used in preference when a suitable range of software is available.

New Zealand is an ideal country for digital mode development, and has seen many innovations in the past. DominoEX is (like MFSK16, Sequential MT-Hell and PSK-Hell) a New Zealand invention, and was designed and developed here by Murray ZL1BPU and Con ZL2AFP. DominoEX uses a series of important new developments to improve the performance of MFSK. A special tone management algorithm ensures that the signal spreading caused by multi-path cannot affect reception; differential frequency coding is used, which eliminates frequency drift and offset problems and "spreads" interference at the receiver to minimize its effect; and a special "nibble varicode" provides highly efficient character coding.

There are several other innovations in this new mode, which is very simple to use. It has a synchronous tuning display which allows the signal to be seen clearly and tuned in even when very weak; it has a full extended ASCII character set which allows transmission of files and accented characters; and an extra "secondary" character set which sends pre-defined data when the transmission is otherwise idle. This data is displayed in a separate receive window. This facility has many uses, the most obvious being to provide full-time automatic ID of each transmission.

DominoEX does not require high power, and works well on 80m even when there is a lot of static, or evening multi-path reception. It is an ideal mode for low power portable or emergency use. DominoEX is very robust without requiring FEC, although an FEC option is offered for when near-perfect reception is important. Six speeds are provided, so the speed can be changed to suit conditions. The default 11 baud mode suits evening and daytime conditions, and operates at 62 wpm, faster than most people can type. Early evening and low power suit using the 8 baud mode, at 50 wpm. FLDIGI by Dave W1HKJ has DominoEX and is available in versions for Windows, LINUX, OS-X and FreeBSD.

THOR

This new mode from Dave W1HJK is a cross between DominoEX and MFSK16, and has the benefits of both. It uses the differential frequency coding and 18 tones of DominoEX, along with a secondary text capability. It uses an extended MFSK16 binary varicode alphabet, allowing the use of control characters to support the HF ARQ protocol developed by Paul K9PS. The FEC is the same robust convolutional coder developed for NASA and used in MFSK16. This mode has the same symbol rates as DominoEX (but half the typing speed), is very effective in the presence of multi-path propagation, and as the name implies, this mode is extremely robust, especially in the presence of lightning noise. It is available in FLDIGI by Dave W1HKJ, which also provides ARQ operation with mail clients.

MT63

MT63 is an amazing mode that would not have been possible without Digital Signal Processing. Developed by Pawel SP9VRC purely as an academic challenge, in this mode 64 PSK carriers are transmitted at once, each one carrying a different part of the transmitted signal. The data (which includes strong FEC) is spread across the width of the signal, and also spread in time, so MT63 is resistant to both time and frequency related interference. MT63 is very tolerant of poor operating conditions and interference. Unfortunately the signal is rather wide for a digital mode (typically 1 kHz), and very aggressive (causes interference but is not much affected by interference), so needs to be used with care. MT63 is an excellent mode for transmitting bulletins or leaving messages on unattended computers. Users often think that MT63 is very sensitive-this is not in fact the case-it just seems so, because the signal sounds like noise and looks like noise on the tuning display, and because it has such good error correction.

The MT63 software by Nino IZ8BLY is simple to use, easy to tune, locks on to the signal effortlessly, and is extremely robust. It is very sensitive, and excellent for DX under poor conditions. The MIXW version is even better, with higher sensitivity and better tuning tolerance. There is also a very good version of MT63 for LINUX in gMFSK by Tomi OH2BNS, and for all operating systems in FLDIGI by Dave W1HJK.

Olivia

Developed recently by Pawel SP9VRC, this mode is a marriage of MFSK transmission with the

highly redundant FEC used with MT63. Unfortunately the typing speed is very slow, there is a long delay between transmission and reception, and the bandwidth rather wide. The performance in terms of sensitivity and interference rejection is similar to MT63, and the mode enjoys good drift and tuning tolerance.
The most widely used version uses 32 tones in 1 kHz bandwidth, but there is a wide number of very confusing and non-compatible variations, difficult to tell apart, and differing in bandwidth, baud rate and number of tones. There are add-ons for these modes in MIXW, and Olivia is offered in MultiPSK and FLDIGI.

Hellschreiber

This elegant mode almost became a lost art, but began an enthusiastic revival in the late 1990s thanks to the PC and sound card. Text and simple graphic symbols are transmitted uncoded, rather like sending the dots to a dot matrix printer. Because the signal has very high peak power compared with the average power, and is interpreted by eye rather than by electronics, the mode is very immune to impulse noise and requires little power. It is also immune to most ionospheric effects if tuned with care. Since tuning is broad, it is simple to use, ideal for HF and for satellite working.
Hellschreiber has a special appeal that occurs with no other mode except Morse; there is an immense "feel" that the operator has for the propagation of the arriving signal, and the uniquely recognisable "fist" (in this case "font") of the transmission, as well as the signal sound which changes with propagation. The user can choose any one of many fonts to transmit (even "Windows" fonts), although the original 1930s font is still the best. The data rate, typically 122.5 baud, provides a good 25-30 wpm typing speed, depending on the font used. Big black fonts are best for DX, but tend to be slower.
The most commonly used mode is Feld-Hell, an on-off keyed CW radio mode which dates from the 1940s and predates RTTY. Invented by Rudolf Hell, Feld-Hell uses a single 980 Hz keyed tone. It is an ideal mode for 20 m, and performs well on other bands, even 80 m, satellites and moon-bounce.
The most sensitive Hell modes are PSK-Hell and FM-Hell, invented by Murray ZL1BPU and Nino IZ8BLY. These modes transmit the dots as phase reversals. These are excellent DX modes, very sensitive and (FM-Hell especially) not affected by ionospheric flutter in the way PSK-31 is. FM-Hell uses MSK modulation, and does not require a linear transmitter. The HELL80 mode is a Hell original from the 1970s. It operates at 245 baud using FSK, does not require a linear transmitter, and works well on 80m.
The best Hell software is IZ8BLY Hellschreiber by Nino IZ8BLY. It operates multiple modes, includes a very good tuning display, and is really simple to install and use. MIXW, MultiPSK and FLDIGI offer most of these modes, and there are other versions for LINUX (gMFSK) and MacOS (Cocoamodem).

Fax and SSTV

These modes can also be operated with nothing more than a PC with sound card. Fax is very rarely transmitted on Amateur bands, although there is some interest in receiving weather maps on HF (black and white) and weather satellite images (grey scale) on VHF. Both of these modes are straightforward with software like Christian Bock's WXSAT program. The resolution produced by this software is incredible. On satellite pictures it is often possible to identify the South Island lakes, the Waikato River, and puffs of steam from White Island.
SSTV is a great way to share photographs, graphics and simple drawings with friends. The resolution is not very high, but the colour depth is good and the image content is restricted only by imagination and good taste. Much the best program to start with is MMSSTV by Mako JE3HHT. It helps if you have a scanner, digital camera or a good collection of digital images to send. SSTV is typically used to add interest to an SSB contact, and is also used on VHF FM, where picture quality is excellent. There are VHF SSTV nets in several parts of the country from time to time.
A new medium scan narrow-band TV system by Con ZL2AFP offers picture transmission as fast as one frame per second, although resolution is more limited than SSTV. Two of the most popular modes are 48 x 48 pixel RGB colour (3 seconds/frame) and 96 x 72 pixel compressed RGGB colour (4.5 seconds/frame), although there are several others, including faster black and white versions. The NBTV system was designed for use on 80m and is reasonably robust.
The new system uses a remarkable OFDM FM modulation system, where each line of the picture is sent on a separate carrier. There is no sync transmitted, none required at the receiver, and so the transmission is efficient and reception not as prone to noise as conventional TV. The software can transmit AVI (movie) files, still and moving images, and can even use web cameras, digital and TV cameras and TV receiver cards. At the receiver, frames can be averaged to reduce noise, and transmissions can be saved and played back at a higher speed to restore true motion.

Digital SSTV and DRM

Digital SSTV is a recent development that can be experienced if your computer has enough power. The sound card modem used is based on that designed for DRM (see below), but restricted to 2.4 kHz bandwidth. Each block of data includes a checksum, and if the picture is received with some blocks incorrect, a semi-automatic process can request repeats of the missing blocks until perfect reception results. Picture quality is superb–identical to the original picture, and images of any size and resolution are accommodated. Transmissions are also identified by a header which includes the call-sign and image details.
The software tends to expect the user to be an expert, so find an experienced user to help you get started. Signals need to be strong and noise-free, with good propagation conditions for transmissions to be successful. HAMPAL by Erik VK4AES and DIGTRX by Roland PY4ZBZ are probably the easiest programs to use. The WINDRM modem used was designed by Cesco HB9TLK, and can also be used for fast file transfer.
Digital Radio Mondiale (DRM) is a new wideband digital mode intended for MF and HF commercial broadcasting. Reception quality can be very good, with low distortion, and often in stereo, although few stations are receivable in New Zealand at present. The modem uses sophisticated compression techniques, combining amplitude and phase modulation, allowing high sampling rates to be accommodated in 10 kHz bandwidth. There are several different formats allowing for transmissions up to CD quality. The mode is quite immune to fading, and does not suffer from selective fading that causes so much distortion on AM short wave broadcasting. A special receiver is required, but it is possible to receive DRM with a PC using the free DREAM DRM software by Volker Fischer, which works with a 12 kHz IF input to the sound card. A conventional receiver have an adaptor added to provide the 12 kHz output. The software also receives AM, SSB and FM, with very good quality.
DRM can be transmitted using the same software, and has been demonstrated on 80 m by ZL1WTT using an adaptation of a digital phasing exciter designed by W1TAG. High power is required for reasonable transmission range, and the transmitter linear amplifier must have very low distortion, and these conflicting factors makes this mode quite a challenge.

PACTOR

A cross between Packet and AMTOR, PACTOR is a commercial and proprietary FSK system which provides strong error detection and ASCII text with an ARQ format. Efficiency is improved by a clever system where repeated damaged blocks of data are averaged until the check-sum is met, so a complete error-free block is not actually required for correct reception. Many of the newer HF multimode controllers offer PACTOR, and there are some applications for PC or other processor and external modem. PC sound card receive-only programs are available, but like AMTOR, no PC sound card software offers full capability. Pactor operates at 100 or 200 baud, and switches between speeds as conditions permit. There are more recent versions (PACTOR2 and PACTOR3), which offer even better performance, but require expensive commercial hardware.
PACTOR is popular for bulletin board use, and it is rare now to have a conventional contact using PACTOR. There are many Bulletin Board Stations (BBS) available on HF, some with connections to the Amateur Packet network, some with internet connection for mail forwarding. PACTOR is also widely used commercially. The WINLINK stations, for example, are fixed mail store-and-forward stations based around the world, with connection to the internet. Each station has a frequency list that it scans every few seconds. These frequencies are mostly on 40, 30, and 20 m. These stations provide a service to marine and other registered mobile or portable operators, who call on one of the published frequencies. Once connected, the BBS controls operation just like a Packet system.

LF and QRP Modes

Some modes are especially suited to weak signal operation, especially where the data rate can be very low, such as for beacons and for LF operation. Various types of Morse transmission

are widely used, at a low speed (QRS) or very low keying speed (QRSS) that is read visually. One of the most popular ways to receive these modes is to use a Spectrogram such as ARGO by Alberto I2PHD, which was designed specifically for Morse modes such as QRSS3 (3-second dots) down to QRSS120 (two minute dots).

Often the Morse is keyed using an FSK technique which allows the dots and dashes to be the same length and eliminates the need for spaces between elements, speeding up the transmission rate. These modes can also work well for HF beacons and QRP operation. Hellschreiber modes are also popular for QRP, in part because the average power is much less than the peak power, an important factor in portable operation.

A new propagation monitoring system conceived by Murray ZL1BPU and realized by Joe K1JT has been breaking new records for QRP reception distance. Not only have 50mW signals on 30m been copied around the world with some regularity, but the mode has been successfully used for moon-bounce using 100W amplifiers and simple 4-element beams! The new mode is MEPT_JT, and is operated in a similar manner to the QRSS weak signal modes.

Each message takes two minutes to transmit, and contains only callsign, location and transmitted power information. The transmission uses slow MFSK, and is only 6Hz wide. The WSPR software by Joe K1JT has numerous enhancements, such as copying multiple stations at once, and automatically posting correctly received 'spots' on an internet database. The system is used on all bands and about 20,000 spots are posted each day from around the world!

A system called PSKSounder by Con ZL2AFP can be used to measure signal propagation on any band. It has better resolution, narrower bandwidth (2.4kHz) and much better sensitivity than previous 'radar' style techniques. It has been used successfully to measure propagation paths on 30m between ZL and VK6 using just 1W. Propagation delay from one station to another can be measured in real time with a resolution of 500us and a range of 15ms, making it ideal for measuring NVIS propagation. If the ground wave signal is available, absolute transmission time for each path can be measured.

Two separate programs are provided – a transmitter, run by one station, and a receiver, operated by others. The transmitter uses 2000 baud PSK, based on the STANAG 4285 modem. In addition to a repeated pseudo-random timing sequence, the transmitter sends a simple 'payload', typically the user's callsign and location. The receiver uses cross-correlation to locate the pseudo-random sequence and therefore can time and display the various paths over which the signal is received.

Operating frequencies

Narrow band modes (RTTY, PSK31) are to be found at the lower end of the digital allocation on each Amateur band, for example on 20 m from 14.070 to 14.099 MHz. Wider modes are found at the upper end of the allocation, for example on 20 m from 14.101 to 14.130 MHz. On 20 m the modes tend to be segregated to some extent, PSK31 at around
14.070 MHz, then Hellschreiber and other less used modes near 14.075 MHz, followed by MFSK16 and other narrow up to 14.080 MHz, where RTTY prevails. Wideband modes such as MT63 and Olivia are found around 14.109-114 MHz, with SSTV and digital SSTV around
14.230 MHz since they are used in conjunction with voice.

A ZL Digital Modes net operates on Friday evenings on 3560 kHz LSB, from around 8:30 pm. All modes are demonstrated and discussed, and newcomers are very welcome to join in and experience the different modes. The net is the perfect place for assistance in setting up, and for asking questions about Digital Mode operation. Some digital modes operators listen on this frequency every evening, and there are Morse and DominoEX nets on other evenings.

The operating frequency for most digital mode operation is usually quoted as the frequency the transmitter emits when idle, which in some modes can be measured with a frequency counter. For RTTY this is the mark frequency. For Morse, PSK-31 and Hellschreiber, it is the carrier frequency. MFSK16, MT-Hell and DominoEX signals are quoted from the lowest tone frequency. However, for complex modes like MT63, Olivia and SSTV, the frequency quoted is usually that indicated on the transceiver display in USB, since the tones transmitted and the sideband used are fixed by convention.

Most digital mode operation follows the USB-LSB convention used for SSB (LSB below 9MHz, USB above, with now a noticeable trend towards USB on all bands). The exception is RTTY, which for no good reason is always operated in LSB. Some modes (Morse, PSK31, Hellschreiber, AMTOR) can be copied equally well on either sideband. Commercial operation is almost always USB, and the quoted frequency is the transmission centre frequency.

Packet Radio

Packet radio utilises FSK and a protocol known as AX-25, which defines as automatic system to transmit blocks of information (called packets) which include the data, message type, information as to who the data is addressed to and sent from, and a robust error detection system called a Cyclic Redundancy Check (CRC).

Packet radio is organised so that many stations can operate on the same frequency with limited interference. This technique is called Carrier Sense Multiple Access/Collision Avoidance (CSMA/CA). This means that stations listen for other signals before transmitting to avoid collision, but cannot guarantee not to cause interference to stations that cannot be heard. This situation frequently happens when stations on opposite sides of town share a BBS station.

Most, but not all, packets require acknowledgement (an ACK), and the sender will repeat the packet until a correct acknowledgement is received. This technique ensures that the data is received correctly and compensates for collisions and errors, but as the channel activity increases, the useful data rate slows down significantly, as more and more time is spent correcting and sending requests for repeats. There is a special family of unacknowledged messages, called an Unconnected Information (UI) packet, that is widely used for beacon messages and for the Automatic Position Reporting System (APRS) developed by Bob Bruniga WB4APR.(4) The UI-View software by the late G4IDE is very popular for this application. APRS networks operate in most centres, either using a local data repeater or the APRS calling frequency, 144.575 MHz.

APRS is popular for tracking mobile stations equipped with GPS position location and equipment to automatically transmit the position, speed and heading of the vehicle. It is also remarkably effective for sending simple chat-type messages. The most common Packet format is 1200 baud AFSK using an FM transmitter. A device called a Terminal Node Controller (TNC) is generally used with a computer. The TNC contains both the packet controller and modem. The mobile APRS units only need to transmit, and so a small micro acts both as controller and modulator.

Most packet radio operation takes place on 2m and 70cm. Appropriate frequencies are listed elsewhere in the Call Book. Data repeaters, similar to voice repeaters, provide increased operating range. These are listed in the Call Book 'Repeaters and Beacons' section

References

All the software referred to is easily found by internet search by name or author. DominoEX, the Narrow Band TV and PSKSounder are available from www.qsl.net/zl1bpu/ZL2AFP.

[1] Digital Modes for All Occasions, Murray Greenman ZL1BPU, published by the Radio Society of Great Britain, ISBN 1872309 82 8.

[2] See Files folder on Call Book CD.

[3] Install from Files folder on Call Book CD.

[4] See www.aprs.net/.

NZART's PRIORITIES:

The interests of its TRANSMITTING MEMBERS, and, the access by RADIO AMATEURS to bands throughout the RADIO FREQUENCY SPECTRUM, by membership and active support of the INTERNATIONAL AMATEUR RADIO UNION.

DX CLUSTER NETWORK

The DX Cluster Network has become the most popular and exciting way for Ham Radio operators interested in DX'ing (working the world) to exchange DX-related information in real time. If you are a keen DX hunter, then this is the place for you to be.

For example, a DXer who has just worked a rare DX callsign, can post this information as a "spot" on the DX Cluster Network in real time, for the benefit of others who may wish to work this rare station. Or, if you are looking for a rare DX callsign you can monitor the "spots" posted by others on the Cluster network.

DX Cluster servers are linked to one or more other stations around the World who have installed the same or similar software. These nodes when connected are called a cluster. Clusters are connected to other clusters, expanding the network. Individual users can connect to any one of these Networked Nodes by either Telnet, or local Packet Radio Ports. Users are capable of announcing DX spots and related announcements, sending personal talk messages, sending and receiving mail messages, searching and retrieving archived data, and accessing data from information databases, among many other useful features.

DX Cluster Nodes have extensive filtering rules for the User to choose from. This means you can view only 80m spots, or 40m spots, or CW spots only, or SSB spots only. This is particularly useful during Contests when you wish to see only specific 'spot' information. Filtering is vital to limit the flow of data on slow 1200 Baud Radio Links.

These features and many others are already built in to a number of dedicated DX Cluster client programs available today. It is now possible to have total rig control from the DX Cluster client program.

The two DX Clusters currently operating in New Zealand are up to date with the latest software versions and offer all of these features plus many more.

Connecting to a DX Cluster Node

The two methods of connecting to a DX Cluster Network Node are Telnet via the Internet using a Telnet client program, and Packet radio via the Global Packet Radio Network.

Internet connection to ZL2AQY-10 is "Telnet:olson.net.nz" and Port 9000

Internet connection to ZL2ARN-10 is "Telnet:zl2arn.ath.cx" and Port 7300

Both ZL2AQY and ZL2ARN are "ported" to the National and Global Packet Network via the Xouter software. You will find Netrom entries AKDXC for ZL2AQY-10 and ZLDXC for ZL2ARN-10. These entries will give you direct access to the respective Clusters.

If you are a keen Dxer on any band including VHF/UHF/SHF, then the DX Cluster Network is the place to be for up to date information and news on who is doing what and where and when.

Eddie Olson ZL2AQY
Gordon Stewart ZL2ARN

AMATEUR RADIO RECORDS

NEW ZEALAND VHF/UHF/SHF RECORDS 2010

Band	Frequency	Type	Stations	Date (DMY)	Mode	km	Prop
6 m	50 MHz	O/seas	ZL3VTV/1-EH7KW	03/04/01	SSB	19921	F2
6 m	50 MHz	O/seas	ZL3JT-N6XQ	04/03/01	PSK31	14268	F2
6 m	50 MHz	EME	ZL2BGJ-WA4NJP	08/09/88	CW	13256	EME
6 m	50 MHz	EME	ZL3NW-F6FHP	03/03/06	JT65A	19441	EME
2 m	144 MHz	Int.	ZL2ARW/p-ZL1BJB/p	03/02/82	SSB	1069	TD
2 m	144 MHz	O/seas	ZL1CN-VK4DMC	29/12/07	SSB	3549	TD
2 m	144 MHz	O/seas	ZL1BT-VK7MO	04/01/07	JT65	2443	TD
2 m	144 MHz	Int.	ZL1IU-ZL4LV	28/10/05	FSK441	1214	MS
2 m	144 MHz	EME	ZL3TY-EA5ZF	19/06/05	JT65B	19242	EME
2 m	144 MHz	EME	ZL2BGJ-G3POI	26/05/85	CW	18821	EME
70 cm	432 MHz	Int.	ZL2ARW/p-ZL1BJB/p	03/02/82	SSB	1069	TD
70 cm	432 MHz	O/seas	ZL1IU-VK7MO	31/12/05	SSB	2432	TD
70 cm	432 MHz	EME	ZL3AAD-G3SEK	12/03/89	CW	18970	EME
70 cm	432 MHz	EME	ZL2DX-HB9Q	15/11/05	JT65B	18801	EME
70 cm	425 MHz	Int.	ZL2TWS/p-ZL2ASF/p	31/01/82	TV-VSB	373	LOS
50 cm	610 MHz	Int.	ZL2UGR/p-ZL2AJI/p	23/04/88	SSB/FM	302	LOS
32 cm	925 MHz	Int.	ZL2TRV/p-ZL1TBG/p	30/11/02	NBFM	620	TS
23 cm	1282 MHz	Int.	ZL2TV/p-ZL1TPH/p	06/12/08	TV-WFM	159	LOS
23 cm	1296 MHz	Int.	ZL2ARW/p-ZL1THG/p	30/01/82	SSB	687	TD
23 cm	1296 MHz	O/seas	ZL1AVZ-VK2FZ/4	30/11/95	SSB	2317	TD
23 cm	1296 MHz	EME	ZL3AAD-PA0SSB	13/06/83	CW	18657	EME
13 cm	2304 MHz	Int.	ZL2ARW/p-ZL1THG/p	31/01/82	NBFM	687	TD
13 cm	2304 MHz	EME	ZL2AQE-W3IWI/8	18/10/87	CW	13931	EME
9 cm	3456 MHz	Int.	ZL2AQE/p-ZL2ARW/p	06/03/83	NBFM	547	TD
5 cm	5760 MHz	Int.	ZL2TV/P-ZL1TPH/P	28/12/05	SSB/CW	485	TS
5 cm	5760 MHz	Int.	ZL1TPH/p-ZL1SWW	03/09/06	FSK441	48	TS
5cm	5760 MHz	EME	ZM2TV-JA8ERE	24/04/10	CW	9461	EME
5cm	5760 MHz	EME	ZM2TV-W5LUA	25/04/10	SSB	12027	EME
3 cm	10368 MHz	Int.	ZL1TPH/p-ZL2IP/p	04/01/09	SSB	551	TD
3 cm	10368 MHz	EME	ZL1GSG/p-DJ7FJ	12/03/97	CW	18340	EME
3 cm	10368 MHz	Int.	ZL1SWW-ZL1TPH/p	03/09/06	FSK441	48	TS
1.2 cm	24000 MHz	Int.	ZL1TPH/p-ZL2IP/p	12/03/06	SSB	221	TD
1.2 cm	24000 MHz	Int.	ZL1TPH/p-ZL2IP/p	05/03/06	SSB/CW	169	LOS
0.6 cm	47000 MHz	Int.	ZL1TPH/p-ZL1AVZ/p	01/05/05	SSB	47	LOS
2.5 mm	122280 MHz	Int.	ZL1TBG/p-ZL1TPH/p	06/02/10	NBFM	0.3	LOS

NOTES:

1 NZ 70 cm band has now been reduced from 420-450 MHz to 430-440 MHz. The TV Record of 31/01/1982 on 425 MHz lists as a 70 cm Record.

2 NZ 13 cm band has now been reduced from 2300-2450 MHz to 2396 MHz-2450 MHz. The Records of 31/01/1982 and 18/10/1987 list as 13 cm Records. This band now known as 12 cm band.

3 NZ 50 cm band has now been reduced and changed from 610-622 MHz to 614-622 MHz. The Record of 23/04/1988 lists as a 50 cm Record.

4 /p means portable operation.

5 /# means operating in another state or district.

6 Propagation Modes: Line Of Sight (LOS), Tropo Duct (TD), Tropo Scatter (TS) Meteor Scatter (MS), F2 layer and Earth Moon Earth (EME).

7 Sporadic E is a propagation mode that is difficult to verify and is therefore listed as a Tropo mode.

Operating Modes

Direct Connect

Where a repeater at one location (Node A) connects via the Internet with another repeater (Node B). With this type of link the two nodes or repeaters can be involved in the connection or resultant conversations. While repeaters "A" and "B" are connected, anyone attempting to connect with either node will be told by a recording that—"The node you are calling is currently connected to call-sign". All local traffic on each repeater will be heard on the other repeater as well.

Reflector Connection

A reflector is a computer that is not connected to any radio, it is connected to the internet allowing many repeaters to be inter-connected, redirecting received audio back to all other connected repeaters. At any given time there maybe 2 to 10 repeaters around the world interconnected via a Reflector.

With reflector use a gap of approximately 10 seconds must be left between transmissions, this allows:

- For the delays created by multiple Tone Squelch radios in the links between the repeater and IRLP link.
- users on other nodes a chance to check in.
- other nodes time to send touch-tone commands to drop their node.

Also allow a delay of approximately three second from the time pressing the PTT button at the start of a transmission.

With IRLP your transmission is now being heard on many repeaters around the world. To ensure intentions are understood give your callsign (phonetically) along with your name and QTH of the repeater you are monitoring for a call. Mobile listeners may only pick out your prefix, your name or QTH.

When calling a station state your intentions by always identifying whom your call is meant for.

Example: Several stations including a DX station complete a QSO and you wish to contact the DX station. Action: VK3xxx this is Mike ZL3TMB in Christchurch New Zealand. By doing this rather than just using your call-sign you leave no question whom you wish to contact.

Making a direct connection

Listen on your local machine for 15–30 seconds before transmitting, ask if the repeater is currently in use. If all is clear, identify your self and give the node name or number you wish to call. Example: "ZL3TMB connecting to the Sydney node"—then enter the ON code for the node (node number then a 0) and release your PTT. Your local repeater will transmit carrier for a few seconds while waiting for the connection to be authenticated. Connections are confirmed with the transmission of the voice ID of the destination node and your node's voice ID on the destination repeater.

If your node is already connected to another node or reflector the greeting "your node is currently connected to ID of the connection" is played. In this case confirm if anyone desires the connection before closing it using the OFF code (node number then a 1 or just dial 73).

Once connected wait at least 15 seconds before transmitting because:

- The repeater may be in use, and your entry may have occurred between transmissions.
- The voice ID of your node is longer than the voice ID of their node, and the connection is not made until the ID is fully played.
- Their node computer may be slower, and hence take longer to process the connection than yours.

Press and hold the microphone PTT for a second and then announce your presence and your intention such as you are calling someone specifically or just looking for a QSO with another ham in that city.

If no response is heard, announce your call and your intent to close the connection then key in the OFF code (node number then a 1 or just 73). This a normal courtesy and a regulatory issue in some countries who may be connected to the reflector.

Some nodes are configured so you cannot connect to them if that repeater is active and the message "The node you are calling is being used locally" will be heard If your repeater is inactive for 4 minutes the connection will automatically close transmitting a voice ID disconnect message on both nodes.

Connecting to a reflector

Listen to your local repeater for local use and then announce your intention to use the Reflector and send the ON command. When you hear the confirmation ID always WAIT at least 15 seconds before transmitting as you are most likely now connected with many repeaters and a QSO could be in progress. If after 15 seconds you hear nothing, identify yourself and indicate you are listening to the Reflector from "City and Country". As your local repeater possibly now has world-wide coverage include your QTH.

Connections to the reflectors time out with no activity however many node owners set this to a long period so it is not unusual for repeaters with minimal traffic to stay connected to the Reflector for extended periods. When a node times out from a Reflector the message "Activity time out ... Reflector xxx, link off" will be played.

If you hear or wish to engage in a prolonged rag-chew on your local repeater out of courtesy to other node listeners drop the reflector.

Error messages

From time-to-time you may receive connection error messages, common ones are:

"The node you are calling is not responding, please try again later", caused by a loss of internet connectivity to one end of the call attempt.

"BEEP Error—The call attempt has timed out, the connection has been lost", occurs when a node is OFF-LINE. or there may be temporary net or node problems.

"The Connection Has Been Lost", the internet connection has dropped.

If you are new to IRLP you should always consult with your local node sponsor to confirm the local guidelines on reflector connections in your area.

The latest node numbers can be obtained direct from the IRLP website <http://status.irlp.net/>.

New Zealand IRLP Nodes

as per http://status.irlp.net August 2010

Node ID	Call-sign	Location	Frequency	CTCSS
6095	ZL1AM	Whangarei	438.7000	None
6950	ZL1BQ	Auckland	146.7000	None
6549	ZL1IS	Waikato Repeater	146.9500	None
6609	ZL1KIWI	Hamilton	144.7000	88.5
6394	ZL1KW	Kawerau	147.0000	None
6105	ZL2AA	Gisborne	146.8000	None
6793	ZL2AS	Hastings	147.2500	None
6943	ZL2KO	Feilding	147.1250	None
6285	ZL2KS	Blenheim	146.9500	None
6081	ZL2KS	Blenheim	438.4500	192.8
6910	ZL2LD	Masterton	147.1750	None
6501	ZL2QS	Hastings	432.7000	123.0
6931	ZL2VH	Upper Hutt	147.3000	None
6900	ZL3TMB	Christchurch	145.625	88.5
6397	ZL4AU	Invercargill	146.4500	None
6184	ZL4DM	Dunedin	146.6500	None
6507	ZL4JH	Dunedin	147.4250	None
6642	ZL4QS	Alexandra	146.5250	None

International IRLP Nodes

as per http://status.irlp.net August 2010

Node ID	CallSign	Location
1000	VE7RHS	Vancouver 2010
1003	VE7ISC	Nanaimo
1010	VE7RHS	Vancouver 2010
1015	VE7RNV	North Vancouver
1020	VE7RNA	Chemainus
1030	VE7VIC	Victoria
1041	VE7BYN	Sicamous
1050	VE7RVN	Vernon (SIRG)
1057	VE7SML	Tatlayoko Lake
1066	VE4WRS	Winnipeg
1068	VE6HM	Edmonton
1070	VE7MFS	Coquitlam
1073	VE7RAD	Chilliwack
1080	VE7TSI	Kamloops
1089	VA6WY	Edmonton
1120	VE7KU	Port Alberni
1126	VE7RBH	Smithers
1130	VA7LPG	Nanoose Bay
1147	VE7SQR	Squamish
1148	VE7GDH	Salt Spring Island
1150	VE7NUT	Summerland
1160	VE7RAP	Comox
1164	VE7PEN	Penticton
1180	VE7PQA	Parksville
1188	VE6RCM	Medicine Hat
1190	VE7UHF	Richmond
1205	VA4FIL	Winnipeg
1207	VE7BAS	Richmond
1210	VE7DQC	Prince Rupert
1228	VE7DIR	Vernon
1250	VE7FFF	Prince George
1255	KE5KAF	Laredo
1260	SARA	Province-wide
1269	VA7SCA	Vancouver
1270	VA6IRL	Lethbridge
1301	VE7EGO	Vernon
1330	VE5CMR	Saskatoon
1340	VE5BRC	The Battlefords
1350	VE5SKN	Saskatoon
1353	VE6QE	Red Deer
1360	VE5CC	Saskatoon

Node ID	CallSign	Location
1370	VE5LAK	Prince Albert/Christopher Lake
1375	VE7DTT	Okanagan Falls
1380	VE5MLR	Meadow Lake
1396	VE7RPS	Vancouver
1403	VE7ICA	Langley
1404	VE3SPA	Pickering
1408	VE5WEY	Weyburn (The Opportunity City)
1420	VE7RAM	Tappen
1450	VA6SHS	Peace River
1460	VE6TSR	Grande Prairie EcholRLP 509961
1461	VE7RVA	Abbotsford / Chilliwack
1463	VE7RSC	Surrey
1491	VE7OGO	Kelowna
1503	VE7VCR	Chilliwack
1547	VA7MWR	Clinton Village
1550	VE5WM	Regina
1553	VE4KEY	Winnipeg
1560	VE7FFU	Terrace
1570	VE5SCR	Swift Current
1590	VE3TCR	Brantford
1649	VE7OVY	Victoria
1660	VE7CAP	Cranbrook
1662	VY1YC	Whitehorse
1694	VE7RPT	Vancouver
1705	VE7RST	Abbotsford
1710	VA5PAR	Yorkton - EcholRLP #48431
1725	VA6SVM	Olds
1727	VE7CUP	Houston
1750	VE4FFR	Flin Flon
1755	VE7BSM	Nanaimo
1766	VE5MBX	Martensville
1807	VE5LCM	Rocanville - EcholRLP #425463
1809	VE4WSC	Winnipeg
1810	VE6XZ	Calgary
1811	VE7EDA	Nakusp
1840	VA6JAC	Edson
1849	VE7MTY	Pitt Meadows-EcholRLP #44463
1850	VE6COM	Lethbridge EcholRLP 2722
1858	VE5MDM	Melville - EcholRLP #342958
1860	VE6JBJ	Airdrie
1870	VA6XG	Edmonton
1882	VE5PSC	Moose Jaw
1888	VE7JFB	Kamloops
1909	VE6RES	Edmonton
1910	VE7RMR	Maple Ridge - EcholRLP -#51910
1919	VE6AFP	Edmonton
1939	VA4BOB	Flin Flon - Echolrlp # 418614
1946	VE7EDA	New Denver
1980	VE7RSC	Surrey
1981	VE4PIN	Pinawa
2000	VA3LU	Thunder Bay
2006	VA2RMP	St. Jerome
2009	VE9SJN	Saint John -EcholRLP #285237
2010	VE7WHR	Whistler
2015	VE3JJA	Sioux Narrows
2018	VE2REH	Gatineau
2020	VE3ULR	Toronto
2027	VA3XRR	Ajax
2030	VE1CRA	Charlottetown
2037	VE3TBF	Haliburton
2040	VE2CRA	Ottawa
2050	VE1NSG	Halifax
2053	VE3IEV	Carp
2060	VE1WRC	Amherst
2069	VE3JOP	Vaughan
2073	VA3OFM	Gravenhurst
2075	VE3URU	Toronto
2080	VE1WN	Greenwood
2088	VE3FRG	Frontenac County
2090	VE3BIP	Belleville
2100	VE3ADT	Halton Hills
2105	VE2RXY	Le Bic
2108	VA3XFT	Toronto (downtown)
2109	VE1BHS	Sugarloaf
2115	VE3PRV	Hammond
2120	VA3RZS	Peterborough
2121	VE3PRC	Brampton
2125	VE2RAX	Quebec City
2150	VE1BAS	Oromocto
2154	VE3TTO	Hamilton
2170	VA3BBB	Windsor
2176	VE3OUR	Marmora
2184	VE3OHR	Ingersoll
2195	*	
2200	VE3OD	Georgetown
2202	VE3III	Windsor
2203	VE3MUS	Huntsville
2210	VE3TST	Ottawa
2211	VA2RUR	Saguenay (secteur La Baie)
2236	VE3KES	Edgar
2238	VE3PCD	Etobicoke
2248	VE3WCR	Niagara Region
2255	VE3WOM	Whitby
2260	VE3OVQ	Guelph
2261	VE3RAK	Toronto North
2268	VE1KEJ	Maitland Bridge(Keji Nat Park)
2270	VE3YYZ	Toronto (downtown)
2271	VE3NIB	Toronto (downtown)
2275	VE3KFR	Campbellford
2280	VA3UW	Almonte
2290	VE4PNO	Winnipeg
2304	VA3PMO	Mississauga
2330	VE3KD	Sault Ste. Marie
2332	VE2RAO	Gatineau
2338	VE3TCO	Simcoe
2340	VE2REA	Quebec city
2363	VE1CFR	Summerside
2365	VE3SRG	Sudbury
2370	VE1HAR	Truro - EcholRLP 161248
2390	VO1MST	Marystown
2400	VE3SUE	London
2404	VE3ERC	Elmira
2405	VE3SME	Simcoe (Norfolk County)
2410	VE3RBM	Kitchener
2414	VA3IGN	Ignace
2439	VE3LEX	Ajax
2443	VE3AZX	Cornwall
2450	VE3RAK	Toronto
2460	VE3MUS	Cottage Country Huntsville
2480	VE3RPL	Parry Sound
2490	VE3KR	Walker Lk Huntsville
2509	VE3BIK	Devlin (Fort Frances)
2520	VE3LKT	Pembroke
2524	VE3WHO	Sarnia
2555	VE3RJS	Campbellville
2559	VE9LNX	Dunlop
2567	VE3ZHR	Haliburton County
2570	VE2CSA	Laval
2590	VA3SLT	Sioux Lookout
2594	VE3SSF	PeterBorough
2596	VE3RIX	Ottawa
2600	VE3PGC	Cornwall
2611	VA3XT	Windsor
2649	VE3ERX	North Bay
2650	VA3OME	Omemee
2651	VA3PMO	Mississauga
2680	VE3RSB	Burlington
2688	VE3LSR	Barrie
2700	VE3ORX	Orangeville
2710	VE3TIV	Kincardine
2718	VA3OPG	BOLTON
2736	VO1CGR	Mount Pearl
2739	VA3DIS	Dryden
2750	VE3KBR	Kingston
2759	VE3EOW	ARES / CANWARN
2768	VE3RIB	Atikokan
2780	VE9ZC	Fredericton
2803	*	
2804	VA3SDG	Cornwall UHF
2805	VE9TCR	Moncton
2811	VE3SVC	Cornwall VHF
2820	VE5NIP	Nipawin
2843	VE3FCG	Stratford
2860	VE3RQQ	Little Current
2874	VE3NMN	London
2882	VA3ERA	ERA System, Southern Ontario
2889	VA2ASC	St-Hubert
2896	VE3ZZZ	Leamington
2897	KE4TTE	Orlando
2907	VE2RWO	Rimouski, EQC
2947	VE3KJG	Lavant
2948	VE3AZJ	Cambridge [iLS]
2949	VE3YQK	Kenora
2952	VE1YAR	Yarmouth
2972	VE3EI	Niagara-on-the-Lake
2973	VE1KIN	Bridgewater
2998	VE3MIS	Mississauga
3000	AH6LE	Beavercreek, Wilsonville, Metr
3003	K7PFJ	Firestone
3004	N6DL	Coalinga
3006	AD7LQ	Grantsville
3007	KL3K	Anchorage
3009	*	
3012	AE6TV	Micro-Node Repeater, GT
3013	W6MV	Santa Barbara
3014	WA6NVL	Culver City
3015	N0SZ	Colorado
3017	WA6LA	Palos Verdes III [WALA]
3018	N5XWD	Houston
3019	KE7ULC	Mobile Node WinSystem Affilate
3024	W6QNE	Bethel Island
3025	N7SZY	Kellogg
3029	K6BSC	Palm Desert
3030	K6VE	Los Angeles
3031	AG6AU	Pilot Peak WIN System/ Red Cros
3033	K7IOU	Tucson
3034	N7BFS-2	Spokane
3035	N5XXO	Odessa
3036	W6CBS	San Carlos
3037	N5OTY	Las Cruces
3039	W7RAT	Portland
3040	KB6THO	Pasadena
3046	K6CRS	Santa Clarita
3050	KB5KZS	Bartlesville
3051	KC6ORG	Perris ESPAÑOL
3055	AG0N	Scottsbluff
3057	W6CX	Mt. Diablo
3058	KK7ECV	Reno WINSystem Affiliate
3059	*	
3062	K7CPR	Hoquiam
3064	N7TGB	Reno
3065	KB7TEB	Ameican Fork
3066	N5ZUA	Smithville - Saltgrass Link
3067	KF7BIG	Issaquah
3069	WA6AVR	Columbia
3071	KK7RV	Sierra Vista "OMIK"
3073	AL2B	Kenai
3075	KD6KAC	Gerlach
3077	K6JSI	Williams - Win System
3078	W7IHC	Salt Lake City
3079	N5GI-2	Fairview
3080	KH6FV-2	Honolulu
3081	WD0EKR	Canon City
3082	N7ARR	Reno -Sparks NARRI
3083	WL7CWE	Anchorage
3085	K5FOY	Mountain Home
3086	KC7DMF	Eugene
3088	WB9STH	Las Vegas
3089	W7DUX	Sisters
3090	KB6JAG	Idyllwild - EchoLink#3091
3092	AB0BW	Rochester Node
3093	WB5QHS	Lordsburg
3097	N5FAZ	El Paso
3098	W7AAE	Henderson
3100	WA6LVX	Bakersfield
3101	KC0QJZ	Mina Lake
3102	KC6TAC	Simi Valley
3105	NM7R	Chinook - WIN System Affiliate
3106	W0ANM	Saint Michael
3107	WT9S	Tonopah
3111	K7MAV	PARADISE / LAS VEGAS
3112	KH6DQ	Honolulu
3113	K6IB	Fremont
3114	KE6DEL	Huntington Beach
3115	WB6NDJ	Oakland (EcholRLP)
3116	N7ERT	Pendleton
3117	WA6MSN	Visalia
3118	KM0R	Midway
3122	W7JWC	Kennewick
3124	NA0US	Longmont
3127	W5AC	College Station
3128	KT6U	Upland
3129	KB6ZOP	Rohnert Park
3130	KC7BSA	Fruitland
3132	W7YC	Houston
3133	KA6DWN	CalNet-SiliconValley
3134	W7YC	Orlando
3135	K7MLA	Herriman
3137	W7YC	Tucker
3139	KB6Q	Nipomo Central Coast
3141	W6KGB	Oxnard
3143	WA6HWW	Grants Pass-WinSystemAffiliate
3144	W7UDI	Hobart
3146	W6RWN	Mission Hills
3148	WA0VJR	Las Vegas
3149	W6REB	Santa Cruz
3150	W6YJ	Southern California
3151	KM6D	Indio
3152	WD5IEH	Victoria
3153	K7UND	Springfield
3156	WB0OND	Hastings
3157	W6TUG	MOBILE
3158	N6UG	Roseville
3159	WB6SKS	Albany
3160	W6YJ	Oceanside
3161	W0RRZ	Grand Junction
3163	W5KGT	West Monroe
3165	K6SLS	Smith River WIN System
3166	W7HTL	Las Vegas-Solar Site-4855'
3167	KL3K	Willow MP 70 Parks Hwy.
3170	WD6AWP	Santiago Peak
3172	N6FR	Sacramento
3173	K6IB	Fremont
3174	WA5AOI	Omaha
3175	N9GDM	Conifer
3176	W6DVE	Fontana
3177	K6JSI	Yuma - WIN System
3178	K6KYA	Link
3179	KF6CHA	Santa Monica
3180	W6DRA	Palm Springs (Tram Repeater)
3182	W7JLC	Prescott
3183	WB6QAZ	Cloverdale
3184	K6IB	Fremont
3188	K7OGM	Fish Haven - Bear Lake
3190	WD8CIK	Hollywood
3192	KE5PTZ	Conroe
3193	WB7ABP	Santa Rosa
3194	N7ARR	Las Vegas NARRI
3196	KH6DAD	Mililani
3197	KH6FV-4	Kailua-Oahu
3198	WA5QYE	Enid
3200	AH6CP	Honolulu
3203	NL7R	Valdez
3204	KB6JAG	Hemet - Echolink#416226
3206	K6MFM	Walnut Creek
3207	WB6IAG	Paradise WinSystem Affiliate
3208	W6RCA	So. San Francisco
3211	W7DBA	Huntsville
3212	AH6SJ	Kailua-Kona
3213	KE5NAJ	Rockport
3215	K7MLA	Riverton
3217	KH6FV-6	Pearl Harbor
3219	K6JSI	Willits - WIN System
3221	KA1MZY	Live Oak
3223	W7UPS	Kennewick (Tri-Cities)
3225	WA6UQZ	Lompoc II [WALA]
3226	WA6TUL	Santa Clarita
3227	N7JEH	Spring Creek - (Elko Area)
3228	W6WLS	Santa Cruz/Monterey Bay

Node ID	CallSign	Location
3229	W6RCA	Dixon
3231	K7RPT	Lake Oswego
3234	N6SPD	Monterey Bay & County [WALA]
3239	N0PBA	Mankato
3240	KB7RSI	Las Vegas
3242	W6MAV	Vacaville
3243	WD5MHZ	Greenwood
3244	N6EOC	San Carlos NOC
3245	K0HU	Humboldt
3246	WB6KHP	San Jose
3250	N7BFS	Spokane
3252	W6JAM	Tujunga
3253	KA6IYS	Weldon
3254	WA2JM	Brinnon
3255	KD7DMP	Spokane
3257	KK7EC	Okanogan
3258	W0WWV	Hastings
3260	N7ARR	Las Vegas NARRI
3261	AL4K	Anchorage
3262	N7WMM	Donald
3263	KB0LCR	Watertown
3266	KD0S	Pierre
3267	W7KOP	Provo
3268	KD0S	Pierre
3269	N5RWH	Houston-Clear Lake City
3270	K7SDC	Castle Dale
3274	W5WTN	Las Vegas
3276	K7SKW	Bellingham
3277	AH6HN	Keaau
3278	KC6PXL	Los Angeles
3279	K5RAV	Harlingen
3280	WX7Y	Castle Dale
3283	KE5HTA	Houston
3285	K6LIE	Albuquerque
3286	WA2YZT	Golden
3287	K6SOA	Laguna Beach
3290	N7ARR	Las Vegas NARRI
3291	W0CRA	Denver
3293	AF8D	Kingwood
3294	WB6YMH	Palos Verdes
3297	WB6ZVW	Morgan Hill
3298	AD5ZX	Springdale
3299	W5KTC	Port Lavaca
3300	N6DGT	Tucson
3301	N7NGM	Prescott
3303	AA0BW	St. Joseph
3307	WR7CW	Gillette
3309	N0NDP	Kansas City
3311	AF7DX	Sequim
3312	KB6LMD	Lakeport
3313	KL3K	Palmer
3316	N6USO	Micro-Node Mobile, La Verne
3318	K6BJ	Santa Cruz
3319	K7FED	Henderson
3320	N7GZT	Columbia
3321	W03B	North Las Vegas
3323	K7IZA	Las Vegas, NARRI Affiliate
3324	N7UJK	Aberdeen
3328	K0BVC	Mondamin
3329	N7QXO	Battle Ground
3330	WA7UHF	Seattle
3331	KK6JAB	Santa Rosa
3332	K6IB	Fremont
3333	W7AVM/R	Whidbey Island
3334	AE6TV	Micro-Node "Video" Mobile
3336	KE7OPJ	Henderson
3337	N5ZUA	Cat Spring
3339	W6DVI	San Gabriel
3340	WR6JPL	Pasadena
3341	N7OD	Hemet - San Jacinto Valley
3342	KF5YO	Lakeview
3343	AE6ZM	Lincoln
3344	N6DSP	Stanton [WALA]
3345	W0CBI	Centennial
3347	W0RXX	Irvine
3348	K0KN	Olathe [EchoIRLP]
3349	N0DAY	Sterling
3350	N0PQV	Denver

Node ID	CallSign	Location
3352	W7SP	Provo/Salt Lake City
3353	AL7LE	Soldotna
3354	W9LEO	Maricopa
3356	W7JZU	Boise
3358	K6PNG	1st WinSystem Affiliate
3362	W7WAC	Big Water
3363	KC7CUE	Eureka
3364	K5VPW	Austin
3367	W6YDD	Sacramento
3372	KD7KMU	Laramie
3375	KD6KXG	Loomis - North Sacramento
3376	N7SGV	Clark County ARES
3377	KD7ITP	Oroville
3381	AC7O	Logan
3382	N5SKU	Richardson
3383	W9PCI	Central Point & North Valleys
3387	WA2PVV	Chatham
3390	WB2BQW	New Windsor
3392	KO6KD	Roseville/Citrus Heights
3393	N2GPD	Aliso Viejo
3395	KP4UZ	Las Vegas
3396	N7ARR	Tonopah NARRI
3398	N7VR	Billings
3400	WL7CWE	Anchorage - Wasilla
3402	NA6M	Georgetown
3405	N3ZUU	Breiningsville
3412	K5SLD	Arlington
3413	K6JSI	Coalinga - WIN System
3415	M0GNK	Pateley Bridge
3417	NB7C	Payette
3418	N3TOY	Las Vegas
3420	N7PIR	Portland
3421	WR6ABD	San Jose - LPRC - WIN System
3423	AJ9Y	Tolleson SW Phx
3437	N5KF	Georgetown
3440	AH6GR	Wailuku Heights, Maui
3442	N0CF	Waterloo
3446	KL2AZ	Anchorage
3447	KE6DEL	Littleton
3448	N6RBR	Redondo Beach [WALA]
3450	N0SZ	Boulder [RMHR]
3453	KB5YZY	St. Louis (Olivette)
3454	K7CSL	Tempe
3455	KG6QIL	San Jose
3456	KG5BZ	Port Aransas
3457	KB0GRP	O'Neill
3458	N6HHP	Downtown Los Angeles (WALA)
3459	KL3K	Houston MP 58 Parks Hwy.
3460	WA6LA	Palos Verdes I [WALA]
3464	W7TAR	Jackson
3465	AL7YK	Bethel
3467	KE0TY	Grand Junction
3468	KL0AD	Kodiak
3469	KS6I	Tehachapi
3470	N6ICW	Sacramento
3475	KC7AAD	Spokane
3478	*	
3480	WA6LA	Palos Verdes II [WALA]
3481	KC7TIG	Mobile Node
3483	KL3K	Anchorage
3484	XE1FUZ	Arandas
3486	WB5UGT	De Ridder - Saltgrass Link
3489	N6CCR	K6SCA Red Mule Repeater Group
3491	N7ARR	Pahrump NARRI
3492	K6JSI	Modesto - WIN System
3497	AF6EQ	Sunnyvale-WIN System Affiliate
3500	K6JSI	San Diego - WIN System
3501	WA6HSL	Spokane
3503	KG7SD	Spokane
3505	KF6HPG	Poway
3506	KL3K	Anchorage
3507	N7FM	Spokane
3509	W7KX	Carnation
3510	W7VOA	Seoul HL1/W7VOA
3511	K6MFM	Maumelle
3513	W0JAY	Seymour

Node ID	CallSign	Location
3514	K7SLT	Hayden
3515	KK7AV	Kolossi Village
3517	N5ZUA	Alexandria - Saltgrass Link
3518	W9IKU	Green Bay
3520	WB6EGR	Las Vegas Valley/ NorthWest
3521	N5KJN	Pearland
3522	WB6WXO	Westminster
3526	*	
3527	*	
3529	KC7LGT	Sequim Repeater
3534	KE5BR	Olathe
3535	N0SJK	Ogallala
3537	KL3NP	Nome
3538	K6TEA	San Carlos
3539	KE5FGY	Wimberly - DBL
3540	K6IFR	Palm Springs
3541	W7CTH	Twin Falls
3543	KC7RJK	Eugene
3544	KM6U	Orinda
3546	KI4VLH	Micro-Node in RV
3547	KC6AGL	Orange County, California
3548	AB0VX	Logan
3550	AA7RP	Green Valley, WIN System Affi
3551	KB6KPK	Orange
3555	KE7OPJ	Simplex Micro-Node,Henderson
3556	K6VGP	Mount Disappointment
3557	WA6TXY	Oat Mtn
3558	NZ6L	San Pedro
3560	WB6HII	Ferndale/Eureka
3561	WB0ZUR	Arlington
3564	W7RAT	Portland
3565	KB7RRE	Las Vegas
3567	W0IT	Corpus
3568	KF7FY	Pocatello
3569	K4EZ	Hillsville
3570	N7HQZ	Ferndale
3571	N7MRN	Pahrump
3574	WA7GTU	Cedar City
3575	NR7K	Saint George
3576	WB7REL	Manti
3578	W7DES	Salt Lake City
3580	WU7Q	Sacramento
3583	K7EK	Lakewood/Tacoma
3584	KD7KQG	Magna
3585	WE6L	Upland
3587	WZ6L	Vallejo
3588	KL3K	Anchorage
3589	N6SPD	Monterey Bay [WALA]
3590	N0BVE	Minnetonka
3591	KB0TUD	Bridgeton
3592	KL3K	Seward MP 7 Seward Hwy.
3594	K5DJS	Micro-Node Mobile
3595	W9NSS	Rogers
3598	K6JWN	Dixon
3599	KC7NQU	Yacolt
3600	AK5Z	Harlingen
3602	K5FRC	Bonham
3603	W6PX	Shingle Springs
3606	KE4QAP	Micro-Node Repeater, Sophia
3607	KR7K	Clearfield
3608	NW0K	Colby
3610	N0DNE	Thornton
3612	K6TAV	Fountain Valley
3615	KC7KEY	Maple Valley
3616	K0GFM	St. Louis
3617	KI6RDW	Hermon
3618	K6PTB	Los Angeles
3619	KF6EIA	Lakeport
3620	KU6V	SF Bay Area
3621	WD0C	Colorado Springs
3622	KE5JTS	Woodbridge, CA
3624	KB7RRE	North Las Vegas
3625	K6RCL	Goleta
3628	KE7JFA	Idaho Falls - EchoIRLP #319230
3629	WB9STH	Las Vegas
3630	N7ACM	Reno - Calnet

Node ID	CallSign	Location
3632	W03B	North Las Vegas
3634	KE7PG	Spokane Valley
3635	W5ICF	Sagemont
3639	W5LOS	Beeville
3640	WA6VPL	Lompoc [6 Meters]
3646	W7AOR	Las Vegas
3647	N5XFW	Hot Springs
3648	KE7UOR	Brookings
3650	KE6PCV	Los Angeles - Calnet
3651	KE6PCV	Los Angeles - Calnet
3652	AB7F	Vancouver
3653	KI6IXQ	Costa Mesa
3654	W7YC	Fort Worth
3657	N5SIM	Pharr
3659	KE5BXF	Edinburg
3662	K7IIV	Burien (mobile node)
3663	KI6SEJ	Fremont
3664	K6JRM	Ehrenberg-Win System Affiliate
3666	KL1IO	Valdez
3667	WB6BDD	Pleasanton
3669	XE2ALC	Puerto Peñasco
3671	K6SA	Saratoga
3672	KH6FV-3	Guam
3673	K6TZ	Santa Barbara
3676	KB5GAS	Albuquerque
3677	KE7NTF	Brookings
3678	WB6X	Palmdale
3679	K7VVI	Burien-Seattle Sea Tac airport
3682	KC7IIB	South Jordan
3685	WD5M	Rhome
3686	KA6AMR	Duarte
3688	KI6LUK	Lakeport
3692	KB7KB	Bozeman
3693	AA2V	Milwaukie
3695	N5GI	Dallas/Ft. Worth/ McKinney
3696	WB5UGT	Bastrop
3698	KB8JXX	Anchorage - WIN System Affil.
3699	N1UPS	Westminster
3701	WL3WX	Bossier City
3703	WB6ZVW	Morgan Hill
3704	WX5LAW	Lawton
3705	N7ARR	Mesquite NARRI
3707	K5DG	LaFeria
3710	WA4HND	Grand Junction
3713	WS5D	Clovis
3715	K6JV	Rancho Mirage
3718	N6USO	Claremont
3721	N0ZHF	Alliance
3722	K0ELK	Carbondale
3724	K7IZA	Micro-Node Repeater, Henderson
3725	KH6FV-9	Hilo
3726	KR6WP	Redwood City
3727	K6JSI	Intertie
3728	KL2NM	Juneau
3730	NH6HF	Lihue
3732	KL1DA	Glennallen
3734	W6IY	Bishop - WIN System Affiliate
3737	W6BUG	Portola Valley
3739	N7MRN	Pahrump
3740	KC2QVT	Westampton
3741	WI6RE	Ridgecrest
3744	WA7GIE	detailed info never submitted
3745	KE6HRV	Buena Park (Orange County)
3747	K5MOT	Fort Worth - NWS SKYWARN
3750	W0KU	Golden
3751	K5RNB	Aubrey
3753	N5ZUA	Bayou Vista
3754	W7RUG	Idaho Falls
3755	WA7RVV	Medical Lake
3756	AH6JA	Hilo
3759	KD0EAV	Kansas City
3761	W5PAA	Oklahoma City
3765	WA6ZFT	San Diego
3767	AF6SP	Hacienda Heights
3769	KS0GLD	Goodland

Node ID	CallSign	Location
3770	K1BDX	Houston - Clear Lake City
3771	AC7OD	Monroe
3772	K1BDX	Austin - Bee Cave
3774	KC0HH	Lamar
3778	K1BDX	Huntsville Tx
3781	K6SOA	San Clemente
3785	W6AMG	Thousand Oaks
3786	WX5FWD	Fort Worth - NWS SKYWARN
3787	KL3K	Fairbanks
3788	K6JRM	Hemet
3794	KC0VJD	Limon
3795	WD5IEH	San Antonio
3796	N6SPD	N6SPD Mobile IRLP node
3797	N7EN	Gilbert
3798	KI6UWB	Ripon
3800	AH6JA	Hilo
3801	WB6MYP	Sherman Oaks
3802	KJ6VU	San Jose
3803	WA6UHF	Chico
3804	N7HMS	North Bend
3805	W7YC	Carrollton
3806	W7LKO	Elko
3807	N5KWL	Little Rock
3812	W6REB	Redding
3813	W9JMC	Soldotna (EchoIRLP)357941
3820	KC7GHT	Phoenix - EchoIRLP
3821	W6PBX	Quincy
3824	KD7SKX	Elizabeth City
3826	N7GV	Green Valley
3827	WB6IAG	Mini-Node Mobile
3828	WA6AXO	Juneau
3829	WB5UGT	Lufkin - Saltgrass Link
3830	WB5EKU	Los Angeles
3831	KE7FGB	Green River
3832	N5VAV	Richland Hills/ Ft. Worth
3834	N0WFI	Minneapolis - Ham Lake
3835	WR0U	Mt. Pleasant / Westwood
3836	W7YC	Slidell
3837	N7GTE	Jackson Park
3840	K6IXA	Atwater
3843	AD5OU	Houston
3844	KA6RLP	Santa Monica
3847	K6JSI	Fresno - WIN System
3848	WA6DKS	Granada Hills
3849	K0AMJ	Excelsior Springs
3850	W7FDF	Tucson
3851	WA6E	Loomis
3854	KC0CVU	Colorado Springs
3856	KD6RC	Santa Rosa
3858	KH6FV 8	Honolulu - Portable Node
3860	WA7SPY	Folsom
3862	WA2JM	Monmouth
3864	KC0EFC	Lenexa
3865	KE6LGE	San Antonio
3866	KD5YCY	Abilene/Shep
3867	W5DEL	Oklahoma City
3868	KC0QJZ	Mina
3869	WD5KCX	Houston
3876	NJ7J	Clearfield
3877	WI6RE	Ridgecrest/China Lake - WiN Sy
3880	K6RTL	Orangevale
3881	KJ7IY	North West Washington County
3882	K6TEA	South San Francisco
3884	N6EW	Los Angeles (B.A.R.C. 4)
3886	N5ZUA	Portable Micro-Node Repeater
3887	AC0KC	Fort Lupton
3890	N4OKL	Huntsville
3892	WD7F	Tucson
3894	KD6WAB	Salem
3895	W6MAR	Sacramento, Echo 303846
3896	W7QED	Tucson
3897	WB6IWY	Cornelius
3901	KG6FOS	Bakersfield
3902	K1TJ	Fort Collins
3903	WB5EKU	North Hills
3904	N7DEN	Cheyenne
3907	KA6GEM	Piedmont
3908	K9VKG	Sioux Falls
3909	WW7SEA	Seattle - Columbia Center
3910	WB6DAO	San Gabriel Valley, East of LA
3911	KF6QYX	Las Vegas - Win System
3912	K6JRM	Hemet - Win System Affiliate
3913	N7JYS	Hays
3914	W5MCC	New Orleans
3915	K0RPT	Lincoln
3916	WA7BND	Portland
3917	N7JYS	Russell
3918	KF6CHA	Mojave
3920	K6MF	Santa Barbara
3923	KG6PH	Plano
3924	N7HOR	Tucson
3926	KG6ATN	Foster City
3927	WD6FTB	Santa Rosa
3928	KE7JBK	Safford
3930	K6MF	San Jose
3932	WA6ZFT	Bishop
3936	W0FLO	Chadron
3938	N6EOC	San Carlos NOC
3939	K9GAJ	Santa Fe
3941	WB6AIA	Hemet - EchoLink#39419
3942	WD0BQM	Mitchell
3944	K5JFW	Lakewood
3946	W6SMV	Templeton, CA
3951	K5COD	Victoria
3953	NX5V	Springdale
3956	K5NES	Desha
3957	N1NG	Spokane
3962	WB5UGT	Plum Grove - Saltgrass Link
3967	N6SGX	Ontario
3969	K7KAB	Loving/Graham
3971	W2IO	Renton
3972	WB0QMR	Breckenridge
3973	KC2EE	Spring
3974	N0JPX	La Veta
3976	W7BO	Woodland
3978	K7LWH	Seattle/Kirkland/ Bellevue/Redm
3979	N05DE	Albuquerque
3981	W7RY	Yacolt/Vancouver
3984	KA0BSA	Steamboat Springs
3986	WD5IEH	Gonzales
3987	W6C0H	Hemet - EchoLink#39871
3988	KB5ZPZ	San Antonio
3989	K5DX	Houston
3990	W0CRA	Denver
3992	KE7FZX	Bellevue
3993	K7IEU	Raymond
3994	N6QOP	Northern California & Nevada
3995	KC0LUN	Springfield
3996	KL3K	Victory MP 90 Glenn Hwy
3997	N5WD	Lake Worth
4000	WA3KOK	Washington
4001	WX1PBD	Peabody
4007	W4XKE	Crossville
4011	KP4EOP	WIFI-Portable
4012	KC2PKN	Boston [ILS]
4013	N8DP	Gladstone
4014	KB3SNM	Spring Grove [S. Central PA]
4016	KE2EJ	Plainview
4017	KB3SNM	Spring Grove [ILS]
4019	WX4RUS	Phenix City
4021	K4VMS	Port Charlotte / Englewood
4022	K4PAL	Miami / Fort Lauderdale
4024	AB1EX	Blackstone
4025	KA2AJH	Wellsville
4031	K9IU	Bloomington, IU ARC
4033	WB2MOD	Wellsville
4035	KD8AYM	Owosso
4036	KI6DXN	Fullerton
4038	N3XXH	Laporte
4039	N3WPL	Warren [ILS]
4040	N3CDY	Baltimore
4042	KB9E	Carbondale
4049	W9LKI	Angola
4050	N2BJ	New Lenox
4053	W2RAC	Daytona Beach
4055	KG4YJB	Petersburg-Ettrick
4060	W1IMD	Falmouth
4065	WB4GQX	Cumming
4067	WB2JPQ	Orange City [ILS]
4068	WB2JPQ	Buffalo [ILS]
4069	W4SNA	Winston-Salem
4071	WJ8E	Toledo
4072	WB3IGM	Kane
4075	KP4E	Grosse Pointe Farms
4076	KB4PTJ	Williamsburg
4077	N4IRS	Vero Beach
4083	K3OCM	Dowell
4084	WL7BHJ	Murfreesboro/Smyrna
4085	KP4TR	Tampa Bay
4086	AE1TH	Braintree
4087	W8SAI	Mason
4088	WA3KOK	Ashton
4089	N2XFX	Orchard Park
4090	KB2FAF	Cortland
4091	KD8LXJ	New Matamoras
4096	KB1AEV	Bristol
4097	K2GII	Winter Haven [ILS]
4098	KA9OHV	Warsaw
4100	N3FE	Portable
4103	WB2WJF	Lantana [ILS]
4106	W8VFR	Eaton
4107	WA2ZPX	Patterson
4110	K0PCG	Des Moines
4111	KD4IHB	West Palm -Echolink #41119
4115	W5NRU	under construction (aa5sg)
4117	KC2LRC	Syracuse
4119	KA9KDC	Wheaton
4120	KF6SWL	Omaha - WIN System Affiliate
4124	N4YCW	Niceville - EchoIRLP #290450
4126	KC8LRN	Hillsboro
4128	WC4PEM	Bartow
4130	WA2ZPX	Middletown
4133	W1MRA	Marlborough
4134	KP4EOP	Chicago
4135	WP3OY	Chicago - EchoIRLP 6334
4137	K8KHW	MConnelsville
4138	ND1U	Notre Dame
4139	N2STU	West Sayville
4142	W8FSM	Fenton
4147	KB5ELV	Erie
4148	WA2RYY	Bayshore
4150	N5IUF	Dallas/Ft.Worth
4153	AA8K	Port Huron
4155	W0AC	North Port-ECHOLINK # 41555
4156	WC4PEM	Bartow
4159	W1HDN	Vernon
4163	KD8BMI	Morgantown
4167	N8JPR	Grand Rapids
4168	K8SN	Grand Rapids
4169	KA6UHV	Collegedale
4170	WB7SMM	Caldwell
4171	KN2R	Cape Coral
4172	W4NCR	Wilmington-EchoIRLP-96977
4173	WA3KOK	Laurel
4175	N5CWH	Leesville
4176	WD9GWG	Osceola
4177	WX2NYC	Middle Village, Queens
4179	W4UNC	Chapel Hill
4183	KA4VXR	Hampton
4184	KK2QQ	Brooklyn-Park Slope
4186	K8EHB	Delaware-Columbus
4187	WB9TLH	Kirksville
4188	K3MMB	Frederick
4189	WB2SNN	Portable
4200	AA4LB	Simpsonville
4204	N2VYS	New York City
4207	N2LEN	East Windham NY
4208	KS4BO	Roanoke
4209	AC4DM	Nancy
4213	KC9IXL	Argos
4221	N9OB	River Falls
4222	KB2SOZ	Macedon
4223	NC2EC	MINEOLA
4232	K4DCA	Reagan National Airport (DCA)
4234	N3KZS	Hanover
4235	WB8VSU	Dayton
4239	N9IFG	Ingleside
4242	KB2NYH	Rosedale
4243	W0NWA	Pinnacle Peak
4244	WB9WYR	Niles
4245	NB1MA	New Bedford
4246	N2TDI	Flagler County
4250	WR2ROC	Rochester
4251	AH6EZ	St. Charles
4252	WR2ROC	Rochester
4253	N9UMJ	Buddah
4254	W2FCC	West Arlington
4260	KD4RAA	Raleigh
4265	W2YMM	Bethpage - Long Island
4267	WF8M	Dayton
4270	KD4RAA-2	Raleigh
4273	K5MES	Fort Smith
4280	W9ADS	Champaign-Urbana
4282	WR8ABC	Cleveland
4287	WB2SNN	South River
4288	KA0JQO	Mountville
4289	AE9J	Danville
4291	N3HF	Ocean City
4292	W1AW	Newington
4294	W9GAP	Ogdensburg
4299	WB8APD	Willoughby
4304	WA4MAS	Richmond
4306	AF2A	ITHACA
4307	KG9F	Lisle
4308	G0TTQ/ W4	Foley EchoIRLP node
4309	W2AMC	Peconic
4311	AJ5C	Harrison
4312	N8GCI	Morrow
4314	KB1GXW	Boston
4315	W9YB	West Lafayette
4316	KB9KLD	Maryville
4317	K3ZMC	Pottstown
4318	N4DFQ	Somerset
4320	W1QWT	Scituate
4321	WB4FOW	Fort Myers
4322	W1TOM	Springfield
4324	W6SMV	Mobile Micro-Node
4326	KE7EZJ	KENT
4328	KE5QJQ	Baton Rouge
4329	KC2JES	Lyndhurst
4330	K9WZ	Plymouth
4331	K4QJZ	Front Royal
4335	NS1N	Hingham
4338	N4ARG	Kissimmee
4342	K4RPT	Melbourne
4344	N1HUI	Branford
4346	AB2OQ	Blasdell
4347	W1AEC	Dartmouth
4350	W9DXN	Dixon
4353	KI6SZ	Beavercreek
4354	KF3EM	Hummelstown
4355	W1FY	Framingham
4357	N8UEV	Morgantown
4358	K4TJS	Yorktown
4359	W8FSM	Holly
4364	KA4BNI	Dresden Echo/IRLP Node
4372	KB1FX	Woburn
4373	K8DAA	Holland
4377	W2OEM	Springfield
4380	W9BCC	Wausau
4387	8P6GN	Bridgetown
4388	W1MV	Bridgewater
4391	N8KQQ	Muskegon
4393	W1JLI	Norwood
4395	KB1AEV	Vernon
4396	N2JBM	East Northport
4397	K4RCC	Sylva/Waynesville
4410	N9OIG	Union Grove
4411	N2NFI	Manorville
4415	W4PLT	Port Saint John

Node ID	CallSign	Location
4417	W8DOW	Livonia
4424	W4RAT	Richmond
4427	NS1RA	Danvers
4428	W2PUT	Milan [ILS]
4433	KA4EPS	North Boynton Beach
4434	KB2WVY	Venice
4436	W1AFD	Acushnet
4438	W2VL	GlenOaks
4439	KB2VZS	Fairport
4442	NN4NC	Clarkton
4446	KY2D	Morristown
4448	KB3HIY	detailed info never submitted
4449	KB2AYS	Blue Anchor
4450	N8DNX	Stutsmanville
4451	N9GMT	New Berlin
4456	n2amb	Brooklyn
4458	N4AI	Somerset
4459	KB4PQA	Greenville
4460	WB8NXP	Southfield
4464	W2CEB	Hudson (Spring Hill) [ILS]
4467	N3JUO	New Bloomfield
4469	WA2JSB	West Orange
4473	KA1IFQ	Oxford
4475	K9EAM	Green Bay
4478	W2KPQ	Selden
4479	K8LI	Delta
4480	K1IMD	Eastern Long Island
4483	W9RCG	Pewaukee
4486	N1UEC	Wrentham
4489	KB4ELI	Miami-Echolink #44891
4490	WB2CIK	West Hills
4491	WA2WWK	Amherst [ILS]
4494	KC6HUR	Sun Valley
4500	N3FE	Wellsboro
4501	W9PQ	Melbourne
4502	W8HP	Beverly Hills
4503	KB4PTJ	Williamsburg
4505	W1GHW	Fairfield
4507	KB3PBX	Girard
4513	KC2CWT	Carmel
4514	KD5AR	Oakland - Bull Shoals Lake
4515	N9GMR	Port Orange
4522	WA7RZW	Gray
4523	W8AK	Dayton
4527	WA2EPI	Lake Hopatcong
4529	K8RPT	Maybee
4532	*	
4533	N8VZ	Athens
4542	WA3KOK	Clarksville
4544	AB2OR	Lackawanna
4545	W4AKH	Fort Pierce
4546	WB3EHB	Camden
4547	KC8RBZ	Cincinnati East Side
4548	KG4GOQ	Palm Beach County
4549	KB0IXM	Fargo
4550	W4DOC	Atlanta
4551	WA2ZLB	Manhatten
4557	N4SJW	Charleston
4561	K1CA	Derry
4563	WB2JPQ	Deland [ILS]
4571	N1ZZN	Marshfield
4576	AF2M	Orlando [ILS]
4577	N3GX	Chesapeake
4579	K1RFD	Norwalk
4590	N1HUI	Branford
4591	K2ILH	Amherst / Buffalo
4592	N2QDK	Aibany
4593	K1RFD	Danbury
4597	N8XHZ	Tiffin
4604	WW2ARC	Ocean Township
4606	N9GMT	Milwaukee
4609	KC9HZT	Greenville
4610	WA1NVC	Framingham
4611	KD5KNZ	Baton Rouge
4614	K0KC	Powell (Columbus)
4615	W2GLD	Cherry Hill
4617	W1SMA	Fairhaven
4618	KB9QJN	Merrill
4619	N9DKH	Green Bay
4624	N3HFK	Hopkinton

Node ID	CallSign	Location
4630	N9EP	Barrington
4632	K1BFD	Canton
4635	W8LRC	Lowell
4637	N4TCP	Clayton
4640	N5LEZ	Wichita Falls
4641	KB4CRG	Huntsville
4642	K8BRC	Bangor
4643	N8EOD	Walker
4647	N4BSA	Clearwater
4649	KB9E	Gurnee
4650	KA1UAG	W.Lebanon
4654	K0NOD	Clearfield
4660	KI4L	Nashville
4661	KB2EAR	Kendall Park
4663	W1WPD	Woodbridge
4664	K1PL	Cromwell
4665	KB2RF	Freehold
4666	K2MTB	New Paltz
4667	NR4P	Boynton Beach
4669	N8TWM	Mansfield / EchoIRLP *46692
4670	N9UWE	Danville
4671	N6WI	Berryville - WIN System Affili
4672	K4KWQ	Deland [ILS]
4676	W2MSK	Bergenfield
4677	N2NFI	Eastern Long Island
4678	W4WSM	Bowling Green
4679	N9GN	Arlington Heights
4683	KC2LPU	Byram
4686	W4FOT	Hendersonville
4689	W1IMD	Portland
4700	WR2UHF	Hauppauge [ILS]
4703	K4DND	Charlottesville
4705	K4TTC	Hohenwald
4710	WB8CXO	Akron
4712	N3HF	Silver Spring
4715	WB2JPQ	Eden [ILS]
4718	NG8Y	Pleasant Plain
4719	W4UAL	Tuscaloosa
4721	W4CIA	McLean
4722	NU3A	Newark
4726	N2LQP	Garden City
4727	N9OEQ	Appleton
4730	K9IP	Indianapolis
4732	K9IP	Grandview
4733	W9EI	Could be Anywhere
4734	K9DC	Portable
4737	AB8E	Elkins
4739	WB4BSD	Cleveland
4740	N2MH	West Orange
4748	*	
4751	N1UEC	Wrentham
4753	KI4IVP	Powell (Columbus)
4759	KB1FUV	Salem
4762	WA2QDP	Wellesley Island
4766	K4WWV	Alamo/Jackson - Testing Phase
4767	KE4PJW	Nashville
4769	KE4SCS	Petersburg
4772	KC0ARF	Green Bay
4774	W9YRC	Elmhurst
4775	K4UCF	Orlando
4777	W2QW	Green Brook
4779	K9EQ	Ham Lake
4783	AB2UV	Port Jervis - Orange County
4787	KI4VFB	Ft. Lauderdale-Echolink #47873
4788	KA9VZD	Antioch
4789	K2GE	Sayreville
4790	K3TAT	Media
4793	W3FL	Orange City [ILS]
4799	W2WHS	Webster
4802	KC9EVU	Bloomington
4810	KF6FM	Riverside
4811	VE3VBT	London
4812	KC8QVX	Jonesville
4818	KB8ZGL	Greenville
4819	N2NEI	East Hampton
4823	K2KNB	Old Bethpage
4824	N1RCW	Forestdale [ILS]
4827	WA2GUG	New Hyde Park

Node ID	CallSign	Location
4829	K1LNX	Johnson City
4830	N4IRS	St. Lucie County
4834	KB9VE	Anderson
4835	K8TB	Hudsonville
4842	KB9FMU	DeKalb
4844	N2LYJ	Buffalo
4847	KB3HJC	Carlisle
4850	W9CEQ	Aurora
4851	KC4SCO	Research Triangle Park
4852	K4MJO	South Hill 3 Repeaters
4853	K4HV	Valkaria
4864	KF4LZA	Ft. Lauderdale-Echolink #48646
4866	NC4FM	Rocky Mount
4867	W3SC	Pottsville
4868	WK8H	Vermontville
4869	KM3T	Amherst
4870	W1HHO	Mid Coast
4873	KC8NDZ	Charleston
4878	K2GLP	Sag Harbor
4879	K3OCM	Dowell
4880	N4TCP	Tampa
4881	WA1HCO	Mont Vernon
4882	WB0CPR	Philadelphia
4883	K2ACY	Brigantine Island
4886	KT2K	Sea Girt
4887	KA4EPS	Margate / North Broward County
4889	KC2IVI	East Greenbush
4898	KP4WK	Tampa Bay
4900	AF4TZ	Nashville
4903	K4GRW	Newport
4904	WD4HIM	Orlando [ILS]
4908	W2SO	Lancaster (Near Buffalo & Niag
4910	WA3ADI	Havertown
4915	K2RMX	Brooklyn-Sunset Park
4918	K4PSL	Port Saint Lucie
4921	KG6CXP	Alva - WIN System Affilate
4922	N2FCC	Union
4923	KB2ERJ	Camillus
4924	N8OBU	Dansville
4926	KC8UFV	Toledo
4927	W9BIF	Goshen
4928	AA5SG	Heidelberg
4935	W2NJR	Asbury Park
4939	K9WSS	Westmont
4942	W1CLA	Brookline
4943	KB4ZIN	Williamsburg
4945	KY4K	Henderson
4948	N3CB	Plymouth Meeting
4949	K4ZPZ	Orlando
4951	N2PDO	Long Island,NY
4952	KP4DX	Corona
4953	KC9MFH	South Holland
4954	KI4HZP	Palm Bay
4960	N9GPY	Culver
4961	N9GPY	Culver
4963	KY4MT	Hazard
4967	KB3HJC	Mt Holly Springs
4974	K3BAY	Pasadena
4975	WA4RYW	Knoxville
4977	K1RJZ	Boston
4978	W1MRA	Marlborough
4979	K9GXU	Belleville
4987	W7OTQ	Virginia Beach
4988	KA4EPS	Deerfield Beach
4992	KE7ULC	Vail WIN System Affiliate
4993	W1AD	Rutland
4994	W9UUM	La Crosse
4995	W4RAT	Richmond
4996	K8SN	Jenison
4999	K4FAU	Boca Raton
5034	DM0ZF	Lauf/Black Forest
5046	GB3EE	Chesterfield
5050	KD6LVP	Portland
5056	EB8CTT	Las Palmas
5060	K6LRC	Lake Almanor - Susanville
5070	W4DOC	Atlanta
5097	MB7IMR	Marske by Sea
5100	G4CUI	Sheffield
5108	GB3TU	Tring, Hertfordshire

Node ID	CallSign	Location
5113	GB3WJ	Scunthorpe
5130	GB3DV	Maltby
5140	GB3LF	Kendal
5147	GB3YR	Maltby
5159	EI2TAG	Limerick
5161	G1DVA	Lymm
5170	G6YHW	Middleton, Leeds
5196	GM1PLY	Edinburgh
5199	EA2BKH	Zaragoza
5200	G4NJI	Rotherham
5234	EI7DUR	Dublin
5264	2E0PMT	Micro Node, Haughton Green
5265	MB7IAS	Framlingham
5267	DM0IBM	Hannover/Laatzen
5269	G6OTZ	Burntwood
5280	GB3CA	Carlisle
5289	G4WLI	Middleton, Manchester
5294	MB7IUR	Leicester
5299	DC5MN	Herxheim 2
5302	GB3OA	Southport
5307	DB0BH	Buehl/Black Forest
5310	MM0DEC	Livingston
5330	WA1ZMS	Lynchburg
5339	GB3CS	Glasgow, Kilsyth
5340	WA3KOK	detailed info never submitted
5361	GB3FH	Cheddar
5364	GB3NH	Northampton
5365	DM0MHD	Pfaffenhofen
5367	LA8HRR	Nesna
5370	W9DUP	Downers Grove
5378	DM0QN	Munich (east)
5380	W5EVH	Laredo
5385	2E1EDB	Gateshead Nr Newcastle
5400	GB3PZ	Manchester
5410	GB3KE	Bearsden, Glasgow
5423	SM7TKS	Torpa
5426	GM0LZE	Lewis Island
5429	GB3ZB	Dundry Hill, Bristol.
5430	WW7CPU	West Chandler
5432	M5ABT	Stanley, Durham
5444	SK0BU	Stockholm
5447	M1SJX	Kingston Upon Hull
5450	GB3PZ	Manchester
5466	LA8VRR	Mosjoen
5467	LA9KY	Rodoy
5468	LA9KY	Mosjoen
5474	LA8DR	Sandnes
5477	IZ1DBR	Pollone
5488	GM8HBY	Airdrie
5503	MB7IIP	Ipswich
5505	MB7IXL	Skipton, North Yorkshire
5510	MB7ICS	Dunblane
5514	G0VXN	Freckleton
5515	DB0V0X	Nuernberg
5517	SM6YRB	Kollandso Isl
5518	GB3DM	Dumbarton
5520	KC4SFA	Key Largo [ILS]
5530	KE6YRU	Indianapolis
5533	G6VVM	Harrogate
5550	KD7PSG	Bellingham
5555	MB7IXN	Freckleton
5560	N7TGB	Reno
5562	GB3IR	Richmond
5570	W6FM	San Luis Obispo
5582	GB3TR	Torbay
5588	LA1PHA	Mo i Rana
5590	N9LKH	Milwaukee
5600	GB3LV	London
5610	K6VGG	Los Angeles
5612	GB3DQ	Polperro, South East Cornwall
5620	WA7GIE	Salt Lake City
5682	EI2TBR	Galway
5685	LA1W	Bodo
5690	WE8N	Warren County
5702	*	
5708	GB3XN	Langold
5709	DG3IC	Rohrbach
5717	G3SNA	Greenfield 12m NE Manchester
5720	NG5T	Lafayette - Saltgrass Link

Node ID	CallSign	Location
5723	VK4II0	Brisbane
5750	W6KAP	Volcano-Sacramento-Stockton
5752	GB3FF	Edinburgh
5756	EA5RCI	Elda
5767	EI7MRE	Castlebar
5770	KC4VDZ	Richmond
5790	N8GCI	Could be any where
5799	SK4SQ/R	Leksand / Mora
5800	K2GXT	Rochester
5806	GB3TO	Northampton
5822	DB0RDT	Ingolstadt
5826	G4FLY	Reading
5830	PJ7R	Sint Maarten D.W.I
5841	W5DCH	Corpus Christi
5850	KJ6W	Palmdale
5852	2E0TWS	Sheffield
5860	K7SPG	Seattle
5870	KC0EFC	Lenexa
5877	GB3MH	Crawley
5883	EI7MLR	Waterford City
5888	GB3SL	Glasgow, Kilsyth
5907	IK2XYP	Gambolò
5910	N3CJG	Ocean City
5918	MB7IWR	Dewsbury
5930	WB2RRA	Nyack
5939	GM3ZXG	Greenock
5953	G7HIF	Wellingborough
5960	N1BOW	Niantic
5961	IK6IHL	Sulmona
5971	IT9DLN	Menfi
5993	G3TMD	Scotter
6000	VK2YX	Alice Springs
6008	VK3EGC	Loch Sport
6009	VK5IRL	Murray Bridge
6014	VK4JY	Redbank Plains
6018	VK2RMP	Maddens Pl Wollongong
6036	VK3ADE	Mount Helen (Ballarat)
6037	VK4RFP	Central Highlands & Districts
6040	VK2RTZ	Newcastle
6050	VK2RCZ	Blacktown
6060	VK2RAG	Gosford
6063	VK3RBO	Bendigo
6079	VK3RFY	Hillside, Melbourne
6081	ZL2KS	Blenheim
6095	ZL1AM	Whangarei
6097	VK3XOK	Batesford
6100	VK6RNC	Perth
6105	ZL2AA	Gisborne
6110	VK1RBM	Canberra
6113	VK3CDN	Melbourne
6122	VK7AX	Experimental AR Broadcast Node
6124	VK7RTV	NWT-ATVGp. C/Coast Gawler 6M
6136	VK3CHN	Sunbury
6139	VK4XH	Brisbane
6163	VK4JKL	Cairns via VK4RCA
6184	ZL4DM	Dunedin
6200	VK6RFM	Perth
6202	VK5LY	Riverland
6210	VK2TTA	Wahroonga, Sydney
6214	VK5ZSN	Adelaide wide area
6215	VK4RSS	Brisbane (Oceanview)
6217	VK3JD	Melbourne
6220	VK2RSC	Lismore
6222	VK2BGL	Southern Sydney
6233	VK2DOR	Scone
6237	VK3NE	Gisborne
6239	VK7DY	Hobart - Nth Suburbs
6244	VK4RBY	Mackay
6246	VK4RGT	Gladstone
6247	VK3XEM	City of Whittlesea
6250	VK2ROT	Paddington
6255	VK2POO	Terranora
6260	VK2RWG	Wagga Wagga
6278	VK5RSC	Mt Terrible, Willunga
6285	ZL2KS	Blenheim
6287	VK3RBN	Burrumbeet
6300	VK3RMC	Melbourne
6310	VK3RWA	Western Victoria
6312	VK2RCC	Warrumbungles Linked System
6320	VK3RRU	Merbein
6330	VK3RSP	Mt. Martha
6343	VK8RTE	Darwin
6350	VK3RMH	Melbourne
6366	VK2RBM	Sydney, Blue Mountains
6370	VK3RSR	Melbourne, Australia
6375	VK3IBM	Ballan
6380	VK3RNE	Albury-Wodonga (Myrtleford)
6394	ZL1KW	Kawerau
6397	ZL4AU	INVERCARGILL
6402	VK4RLW	Browns Plains
6404	VK4RC	Redcliffe
6414	VK3YVG	Lilydale
6438	VK6RMJ	Manjimup, Western Australia
6444	VK4RAT	Townsville
6450	VK4RMK	Mackay (Mt Blackwood)
6459	VK8LDR	Alice Springs
6464	VK4RCM	Gympie
6493	VK4TIM	Eastern Brisbane
6496	VK4ZPP	Gootchie
6500	VK5RAH	Lobethal (Nitschke Hill)
6501	ZL2QS	Hastings
6506	VK3RVZ	Melbourne
6510	VK5RAC	Port Lincoln
6527	VK2JJW	Buttaba, Lake Macquarie
6529	VK2RMR	Mt Riverview
6537	VK2PDS	Tahmoor
6549	ZL1IS	Waikato Repeater
6556	VK4YEH	Brisbane
6564	VK4RSC	Sunshine Coast
6572	VK3ATL	Geelong
6600	VK6RWR	Wickham
6606	VK5HS	Renmark
6609	ZL1KIWI	Hamilton
6613	VK2RGN	Goulburn
6616	VK7RTV	NWT-ATVGp. C/Coast, Gawler 2M
6623	VK2RED	Wollongong
6642	ZL4QS	Alexandra
6669	VK4KTX	Logan Central
6683	VK2RMM	Tenterfield Stanthorpe Warwick
6700	VK7TAZ	Mt.Barrow, North East
6702	VK4RGC	Gold Coast
6705	VK3ANT	Melbourne
6707	VK6RAA	Mt Barker, Western Australia
6732	VK8SJ	Katherine
6739	VK7RAD	Queens Domain, Hobart
6782	VK4RAI	Ipswich
6793	ZL2AS	Hastings
6794	VK3RLP	Cranbourne, Melbourne
6800	VK8MA	Katherine
6845	VK5CP	Younghusband
6865	VK5RMN	Port Pirie (The Bluff)
6875	VK5RSE	Millicent
6900	ZL3TMB	Christchurch
6909	VK5RAE	Pt. Augusta (Mt. Arden)
6910	ZL2LD	Masterton
6912	VK2HGK	Hurstville, Sydney
6919	VK4GF	Victoria Point
6931	ZL2VH	Upper Hutt
6943	ZL2KO	Feilding
6950	ZL1BQ	Auckland
6964	VK4BWI	SE Queensland
6973	VK4RAR	Rockhampton
6989	VK4ISP	Alexandra Hills
6992	VK3RGV	Shepparton
6997	VK2RWB	Mulwala (Southern NSW)
7000	J73D	Roseau
7001	KH6RS	Kaanapali Maui
7007	W0DK	Boulder
7008	KP4IP	Maricao
7018	KH6RS	Wailuku Maui
7019	KH6RS	Ulupalakua Puu Mahoe
7020	KH6RS	Mt. Haleakala, Maui
7030	K6JV	Oxnard
7033	N6ZEN	El Granada
7035	KI6YYW	Lakeport
7040	KP4EOP	Deer Park
7045	N7RON	Rawlins
7058	WH6CDT	Kahului
7059	KL2QV	Palmer
7060	W3ND	Harrisburg
7068	KA7G	Lakeside
7069	W6NUT	Cleveland National Forest
7070	WA0OJS	Manchester
7078	N1UPS	Westminster
7097	K6JV	Rancho Mirage
7098	KF7BUE	Eugene
7110	W7DK	Tacoma
7111	WJ2W	New Albany
7112	K7DSR	Las Vegas
7113	WA7RZW	Gray
7117	*	
7123	W6JID	eatonville -win sys affiliate
7140	N4JDW-2	Wilmington
7142	KZ0DEM	Springfield
7149	W5ERX	Canyon Lake - DBL
7150	KL3K	Pippin Lake MP81 Richardson Hy
7151	WT0F	Issaquah
7167	KF7HID	Dubois
7184	KE7IMF	Milwaukie
7190	WD6BNG	Barstow
7192	KP4IP	Severn
7197	WB8GRS	Little Elm
7200	V21ARC	St. Johns
7205	AJ7GZ	Liberty Lake
7210	W9KXQ	Greenville
7211	KD6GDB	Woodland Hills
7214	K6TEA	Pleasanton
7217	N0CSW	Joplin
7220	W1AJI	Derry
7222	K7ZH	Beaverton
7223	KF7REP	Duck Creek Village
7225	WA2WOJ	Croton-on-Hudson
7227	KI6DJD	Micro-Node Mobile
7230	WB1GQR	Bolton
7232	K7NEL	Layton
7235	KI6YXW	RICHMND
7237	WA6DKS	Granada Hills
7247	K6PAC	LINCOLN
7248	XE1SAX	Puebla
7249	KD6KAC	Gerlach
7250	N2HJD	Rochester
7260	W4ECZ	Spring Hill
7268	N0FH	Estes Park
7270	KX1X	South Hadley
7273	W7UZO	Spokane [ILS]
7279	KB0YNA	GRAND JUNCTION
7280	N2CKH	Hendersonville
7290	W2RN	Wood-Ridge
7309	AH7GK	Honolulu
7310	N7QJB	Cheyenne
7331	*	
7342	KP3IV	Manati
7344	AE5RJ	El Paso
7355	XE1AO	Colima
7358	W6PBX	Quincy
7372	*	
7373	KI6FGR	Cupertino
7377	W7TWA	Seattle - WIN System Affiliate
7378	WW7SEA	Seattle - Queen Anne Hill
7379	W7NNQ	Renton
7397	*	
7401	N7SWW	Ogden
7416	W7RGW	SPOKANE VALLEY
7417	W7RGW	Spokane Valley (Mobile)
7418	*	
7419	KF6GOI	Sherman Oaks
7421	N6RJA	San Pedro
7424	KL7GJ	Eagle River
7427	W6CBS	Maritime Mobile
7430	K7LYY	Kalispell
7433	K5ILS	Katy
7438	W0WWV	Nelson
7449	N0JPE	Fairview
7456	W6TCP	Pleasanton
7460	N7TWB	Phoenix
7461	KE7EFB	Mobile
7478	KC0SHM	Fargo
7480	N4JDW	Wilmington
7483	KD5YCY	Haskell
7500	9Y4AT	Valsayn
7505	K1SOX	West Haven
7510	W7TRO	Lewiston
7512	V44KJ	St. Kitts & Nevis
7520	W4YI	Chattanooga
7529	KP4IP	Santo Domingo
7530	W9ICE	Indianapolis
7531	W9ICE	Indianapolis
7540	W6CBS	San Carlos
7550	K9JAC	Hubertus
7557	K9MWL	Milwaukee
7566	KB1HSZ	Eufaula
7569	KP4IP	Aguadilla
7570	K0NL	Phoenix
7578	WP3HY	Hatillo
7609	YV5FIH	Altos Mirandinos
7610	N7XEI	Port Angeles
7620	W7ARA-1	Phoenix (downtown)
7624	KP4CV	Isabela
7628	K7WWA	Willits
7639	KL7MT	Willow
7645	N5BZM	Groves
7650	N6ICW	Sacramento - Lake Tahoe 147.19
7670	W6RLW	San Jose
7671	WP3HY	Luquillo
7682	KE7ZWP	Ridgefield
7689	K5FX	Austin
7700	W9PCI	Central/Eagle Pt.-Med-Ashland
7707	KD7AGA	Casper
7710	W4JAZ	Cocoa
7714	N0JPX	LA VETA MOBILE NODE
7717	KA7NSR	Tempe
7718	KE5FGY	LOCKHART
7720	N2HLT	Branchport
7724	KF5BRU	Harrison
7729	K6TEM	Arcadia
7731	N7ARR	Winnemucca
7737	KK2NY	Patchogue [ILS]
7738	KE5YKM	KENEDY
7739	XE1CDX	Cuernavaca
7748	W0SD	Salem
7758	WL7CWZ	Kodiak
7766	K6KUS	Columbia Falls
7796	WP4IUO	Humacao
7797	KJ6JD	Sacramento
7808	K7FZO	North Bend
7810	NS9M	Terre Haute
7814	W2MGM	Bakersfield
7815	W6RCA	Greenville
7817	KC0WNG	MILLER
7820	WB2HWW	Queens/ New York City
7830	WB2NBU	Wellington
7837	N6IQY	Yuba City
7844	K7GPS	Medical Lake
7849	WP4CBC	Juana Diaz
7870	KA6UAI	Palomar Mtn
7893	WK7B	Phoenix
7898	P43ARC	Yamanota
7900	KN4KL	Virginia Beach
7901	K5FRC	BONHAM
7909	KE7IEE	Portland
7911	AE5R	Harlingen
7930	N8HEE	Charlotte
7931	KL7AA	Anchorage
7950	WB4IVB	Corbin
7955	KD7DUC	Rock Springs
7960	KL3K	Trapper Creek MP 115 Parks Hwy
7962	K6JWN	Dixon
7967	AF8D	Humble
7970	WA6TMJ	Hanover Park [WALA]
7977	*	
7982	WA6UHF	Chico
7992	PJ2BR	Willemstad
7994	KI6RWZ	San Jose

Node ID	CallSign	Location
7995	VP9NI	Smiths Parish
8000	SK6BA/R	Kinna
8003	KN4CI	Moulton
8010	SK4AO/R	Falun
8011	XE1GUU	Guadalajara
8038	JF6YQE	Karatsu City
8045	XE2MZB	San Nicolas de los Garza
8050	SK6QW	Gotene
8051	KB3CXQ	Aurora [ILS]
8058	WR2AHL	S. Bristol
8059	XE1ZAT	Toluca
8066	7J1YAA	Shinjuku-ku
8069	JP3YHP/R	Hirakata
8071	K2YO	Garden City
8088	W1GPO	Totland
8090	LA9XR	Heggedal
8093	JA2WSM	Seki City
8094	W8NBA	Pataskala
8120	WA6BAI	Visalia
8125	XE1FXT	Atotoniico el Alto
8126	XE1LM	Ciudad de Mexico
8127	*	
8129	K8KHW	Marietta
8134	WW4GW	Cumberland
8136	N0EXE	Galesville
8139	KC8QVX	Jonesville
8144	ZS1JEN	Cape Town
8150	N6AWQ	Southern California
8155	W3ALR	Abbottstown [ILS]
8164	JQ1YWK	Hachioji, Tokyo
8165	N6KZB	Wildomar
8170	W6RHC	Chico
8190	N9TO	Westmont
8193	K0DMF	North Branch
8196	AB9IF	Alborn
8203	AG9D	Montgomery
8223	XE3REM	Merida
8225	JF1CER	Shinagawa-ku
8227	*	
8228	WB8GUN	Lambertville

Node ID	CallSign	Location
8232	WA2CBS	New York
8233	N4XJQ	South Punta Gorda
8237	W2FCC	MOBILE NODE
8240	KR6WP	San Carlos
8242	W9OSL	Green Bay
8247	XE1YMY	Toluca
8257	N1CDT	Martinsville
8260	W6HY	Crescent City
8265	N3VSI	Edgewood
8267	KG6LIN	Thousand Oaks
8269	K7IZA	Las Vegas
8270	K4OBX	Hatteras Island
8275	N8NAP	Mobile
8277	N3VSI	Edgewood
8280	NI6M	Clovis
8281	WH7BR	Volcano
8283	JG3IRL	Higashiosaka
8285	KB4PNG	Oneida
8289	XE2EOS	Tuxtla Gutierrez
8300	ZS5Z	Durban
8308	W2IRA	Medford
8310	KB5KZS	Bartlesville
8317	N4FOB	Port Charlotte
8322	K8KHW	Newport
8324	K4MJO	South Hill 2 M Simplex
8327	NY2SI	Staten Island
8332	JQ1YEG	Meguro-ku
8350	KC7TIG	Rathdrum
8363	KA2ZSA	MOUNT VERNON
8365	XE2LRD	Durango
8369	KF4LZA	Miami-Echolink #83690
8373	WT4RA	Isle of Wight
8376	JK1ZRW	Sayama City
8378	XE2SI	Tijuana
8380	W9FEZ	Fort Wayne
8390	k7rmr	Ellensburg
8409	WA2ZST	Southampton
8410	WB6TCS	Oakland
8420	K6BIV	Pittsburg

Node ID	CallSign	Location
8424	KI6DES	San Antonio Winsystem Affiliat
8427	ZS0JPL	Pretoria
8429	XE2NHM	Allende
8433	W1GZ	Fitchburg
8437	JI1BQW	Zama
8440	W5DEL	Oklahoma City WIN System
8484	KB3SDE	Philadelphia
8499	JS1LQI	Koto, Tokyo
8500	9Y4AT	Valsayn
8503	XE3AYZ	SAN CRISTOBAL DE LAS CASAS
8510	KL3K	Girdwood MP 90 Seward Hwy.
8520	N2TLD	Lake Grove
8522	VP9RSB	Devonshire
8524	K0LAV	White Bear Lake
8535	ZU9DCM	Cape Town
8536	K4OBX	Buxton
8550	AA8CC	Buckhannon
8551	JS1CYI	Komae-city
8555	ZS4B	Harrismith
8562	KD3SU	Boonsboro
8566	KW4GT	ORLANDO
8578	AA8RK	Ann Arbor
8600	PI2EHV	Eindhoven
8611	NI4CE	Tampa Bay
8620	PI6EHN	Eindhoven
8623	*	
8626	JA2VOF	Shizuoka city
8628	EA8EE	Las Palmas
8629	KC8MHK	Kalamazoo
8632	JQ1YFK	Minamikoma
8635	W4MEV	Richmond
8643	KC2RQR	Staten Island
8645	AB9OV	Chicago - EchoIRLP 394-440
8648	JF9LGL	Hakusan City
8652	K9NJS	LaBelle
8654	W7RAT	Cannon Beach

Node ID	CallSign	Location
8657	KD3SU	Boonsboro
8662	ZS2PE	Port Elizabeth
8672	NN1D	Fall River
8682	NS1RA	Salem
8691	WA1NPO	Whitman
8709	K4RPT	Melbourne
8717	KC0MPD	Beverly Hills
8719	ZS0JPL	Pretoria
8720	WB5UGT	Houston - Saltgrass Link
8730	K6KYA	San Francisco - WIN System Aff
8770	KB7ZPL	Vancouver
8774	N4AED	Knightdale / ECHOIRLP 4630
8784	KP2O	St. Thomas
8789	KF4LZA	Ft. Lauderdale-Echolink #87892
8794	XE3DX	Tuxtla Gutierrez
8796	*	
8798	XE2GF	Tijuana
8808	W6TRI	Champaign
8838	KC4AAC	Palmer Station
8847	W2GGI	Delray Beach-EchoLink #88477
8851	XE2SI	Ensenada
8864	AF6V	LA HONDA
8866	WD8IEJ	ARCHBOLD
8884	W1AEC	Dartmouth
8892	WB2ZEX	Brooklyn
8895	XE2LRS	Durango
8906	ZS6KTS	Kempton Park
8910	K4LX	St. Petersburg
8913	W9PXZ	Joliet
8929	N2QKV	Brick
8930	KB0WYT	Scottsbluff
8937	WH6FM	Hilo
8939	KG9F	Downers Grove
8950	M0HBK	Englefield Green
8952	XE1RCS	Ciudad de Mexico
8954	JN2UNC	Upper Nagoya City
8993	KB0P	Ishpeming

ECHO LINK

Developed in early 2002 by Jonathan Taylor K1RFD, EdhoLink is a computer program using the Voice-over-Internet Protocol to establish long-distance communications (DX). The program has spread rapidly among the ham community and is today used by over 120,000 radio amateurs in 150 countries.

Instead of using ionospheric layers to establish long-distance communications, K1RFD suggested to amateurs to use the Voice-over-Internet Protocol, using the Internet in combination with RF linking and especially with VHF and UHF FM transceivers to work other amateur stations.

EchoLink has four main user groups

Repeaters

(Eg, ZL3CAR-R) where a computer is connected to a local repeater by radio and any number of people in range of the repeater can use the system.

Links

(Eg. ZL2VBC-L) this normally means that there is a simplex radio link at the remote station, normally less range than a repeater station.

Home stations

(Eg. ZL3TMB) a ham's computer is connected to the Internet, normally this is a home station. Using headphone and a computer style microphone (no ham gear is required, just a call-sign).

Conference servers

(Eg *ZL1VK*) these are just a computer with a very fast Internet connection, no radio gear is required by a server. These servers allow many stations to connect together.

The Papakura Radio Club operates an EchoLink conference server, *ZL1VK* (node 65001). Make sure you connect on Sunday nights from 7pm (New Zealand time) onwards. This server can be used to link computers, simplex radio links and repeater for running local, nationwide or international nets. It is available for both open nets or private nets.

Operating Guidelines

Usual operating practice on EchoLink is to operate just as if you were on amateur radio. If any link station (call-sign-L) or repeater station (call-sign-R) are connected to the conference, you *are* on the radio. Be aware that other users may be anywhere in the world. Please use commonsense and courtesy.

Specifically, pretend you are on a busy repeater. That means:

- Identify with your call-sign now and then. You don't need to ID every transmission.
- Leave a pause of a few seconds between transmissions. This gives others a chance to break in. It also lets linked radios and repeaters drop out, so they don't get timed out.
- If several people are active in conversations, consider turning it over to one specific station at the end of each transmission. Don't consider this mandatory, though. If there is a logical next person to speak, let that person speak. If not, then a simple rule is to rotate speakers in a fixed order. (The on-screen station list makes this easy. It is kept sorted with the most recent speakers on top. So just turn it over to the station on the bottom, or the lowest station who is actively participating.)
- If you want to have a long conversation with one other station, and the subject is not going to be interesting to others, consider dropping out of the conference and connecting directly. If you talk about something interesting, please stay on the conference.

For more information and a copy of the software, check out any of the following links: <http://www.echolink.org/>; <http://www.hamradio.co.nz/>; <http://www.qsl.net/zl1vk/>; <http://www.qsl.net/zl2ufi/>.

RADIOSPORTS – CONTESTING

The term **'Radiosport'** – is widely used internationally these days when talking about amateur radio contesting. AR contests first started around 75 years ago and they now come in all shapes and sizes, from big international 48 hour marathons on six HF bands, to just a one hour 'sprint' with other ZL's on 80m. Apparently participation levels and interest in Radiosport contesting are on the rise, with most international HF contest organisers reporting significant increases in the number of contest logs received and participation numbers.

Contest operating – can provide great incentives and opportunities for improving operator technical skills, station equipment set-ups as well as actual on-the-air operating skills. Contests are great fun as well, as the basic object is of course to work lots and lots of other stations within a defined period. If you chase DX, then contests are also great occasions to improve your personal DXCC Award standings.

Contests can have various operating categories – some are single mode contests, others are multi-mode, eg. single-band, all-bands, CW-only, phone-only, RTTY-only, PSK-only, mixed-mode, QRP, low-power, high-power, single-operator, multi-operator and combinations thereof and there are heaps of certificates to be won to decorate your shack with. For instance in both the Phone and CW CQ WW Contests there are around twenty-five First-Place certificates available just for ZL stations!

Contest operating procedures – for contest newbies the best thing to do is listen to other stations to learn how it's done. There are just two type of contest contacts; either you reply to a station who is calling CQ, or you call CQ yourself and wait a reply from someone else. Make sure you're familiar with the rules for the particular contest before you start of course. Each contest has its own requirement of what information should be exchanged between stations. This 'Exchange' often just consists of an RS(T) report and a 'Serial Number', starting with 001 and incrementing by one for each contact. In some contests the Serial Number is replaced by other information, such as CQ or ITU Zone Numbers, transmit power level or operator age.

The Internet – is a very useful source of AR contesting information. All international contests have a few web pages where the rules and other helpful information about the contest such, as the results of past years are available. Other web pages provide contest calendars with links to contest rules and other general contesting information. For example:
www.sk3bg.se/contest/index.htm
www.hornucopia.com/contestcal
http://www.ng3k.com/contest/
http://www.contesting.com/

Contest log-keeping – was once a pen and paper job, but now thankfully most of us have computers that can help us. No matter how big the contest is, or how many contacts you make, using a computer should make life easier for you and especially the person who has to check and adjudicate your log. Many international contest organisers no longer accept paper logs.

A contest logging software programme – is the best and simplest way to log your contacts. Logging software programmes have been around for a long time now and they come in two types. General logging programmes that are designed for day-to-day general log keeping and contest logging programmes which are dedicated to contest operating only and which thus contain many useful neat features that general logging programmes don't need and don't have. These programmes will not only keep a log of all your contacts, they will do the scoring for you and at the end of the contest you can save a file of the contacts which can be emailed directly to the contest organisers.

The first contest logging programmes were DOS-based, but now Windows programmes are more popular because they are more user friendly and have more features. N1MM Logger is the most popular Windows programme and is completely free. The programme web-site is www.n1mm.com Personally I have been using this programme for the past nine years since the first version of this programme was released in 2001 and really recommend it. Two other Windows programmes are Writelog and WinTest, but neither of these are free. Various free older DOS type programmes, such as SD, CT and TRlog are also still available.

Rig Control – The most basic function of a contest logging programme can be used by merely typing in the callsign and exchange details of each contact as you make them, the programme will take care of the date and times. But the programmes are capable of doing a lot more, when a computer-transceiver connection is used. The programme will be able to key your transceiver and transmit recorded contest exchange information, the programme will always know frequency and mode your transceiver is on and enter these details in the contest log, plus a few more useful tasks and features will become available. This computer-transceiver connection is commonly called 'rig-control'. The connection is usually done via Serial COM port or USB cables, plus for digital modes and SSB modes you may need additional audio receive or transmit or both receive and transmit connections. Most transceivers but not all, need some sort of interface, which can be a simple homebrew one or a commercial one. The N1MM Logger programme Help Files and your transceiver manual will show how these connections are done.

On the following pages, there is a summary list of the New Zealand AR contests, a basic month by month calendar of the more popular international contests, plus the rules for various NZ contests.

NEW ZEALAND HF AR CONTESTS

Contest	Comments	When – weekends	Sponsor
Jock White Memorial Field Day	A contest and activity event for club & individual FD stations, CW &SSB on 40m & 80m	4th February	NZART
Thelma Souper Memorial	80m, refer WARO column in Break-In for details	2nd April	NZART (WARO)
Kiwi Digital Modes Group RTTY	RTTY on 80m	80m–3rd Sat April 40m–4th Sat April	Kiwi Digital Modes Group
Sangster Shield	CW only on 80m only, good contest for QRP & new operators	3rd May	NZART
Memorial	The premier ZL domestic contest, 80m only, CW & SSB	1st July	NZART
Waitakere Sprints	A pair of quick, fun, one-hour contests on 80m	SSB–last Sat July CW–first Sat Aug	Papakura Radio Club
Doug Gorman Memorial Frequency Measurement	Frequency measuring activity on 80m	1st Mon September	Wellington VHF Group on behalf of NZART
Nostalgia Night	An activity evening for old-time radios & their custodians!	1st Sat September	SPAM–Society for the Preservation of Amplitude Modulation
Oceania	Our own premier international HF contest is very well supported by non-Oceania stations	SSB–1st October CW–2nd October	Oceania Contest Committee on behalf of NZART and WIA
Straight Key Night	Some back to basics fun	1st Sun November	ZL1AIH
Kiwi Digital Modes Group Twin Sprint	PSK & RTTY on 80m	1st December	Kiwi Digital Modes Group

RULES FOR 2010 OCEANIA DX CONTEST

1. **SPECIAL NOTES** for the 2010 Contest:

- The SINGLE-OP entry category has been split into High Power (SINGLE OP HP) and Low Power (SINGLE OP LP) categories. Total output power must not exceed 100 Watts in the Low Power category. Rule 7 has been updated to reflect this change.
- The MULTI-SINGLE entry category has been deleted. It is replaced by the MULTI-ONE and MULTI-TWO entry categories. Rules 7 and 8 have been updated to reflect these changes.
- Rule 6 has been updated to clarify that only one entry may be submitted by each operator or team of operators.
- All email logs are processed by an email robot. The robot sends an automated email acknowledgement indicating either acceptance or rejection of the log. If you do not receive this acknowledgment, or are encountering difficulty in having the log accepted, then please contact the Contest Committee at info@oceaniadxcontest.com
- Electronic logs are to be in Cabrillo format which is now generated by all popular contest logging software programs. Alternatively entrants can use the forms at http://www.b4h.net/cabforms/ to manually create and submit a Cabrillo file.
- Portable prefixes must be inserted in front of the home callsign, e.g., W1XXX operating in ZL1 would sign as ZL1/W1XXX.
- If the station worked does not provide a serial number, then log the received number as 001. See rule 8. This new provision allows credit for contacts with stations that are not in the Oceania DX Contest.
- A reminder that Single-Op Single Band logs must record ALL contacts made by the station–both on the band chosen for the entry and on any other bands.
- Stations must log a minimum of 10 contacts to be eligible for an award.

2. **CONTEST PERIODS:**

PHONE Contest: 08:00 UTC Saturday 2 October to 08:00 UTC Sunday 3 October 2010
CW Contest: 08:00 UTC Saturday 9 October to 08:00 UTC Sunday 10 October 2010

3. **THE AIM** of the contest is to promote HF contacts with stations in the Oceania region (VK, ZL, Pacific Islands and other locations within the IARU "Worked All Continents" Oceania boundary).
4. **THE OBJECT** is for:

- Oceania transmitting stations to contact as many stations as possible both inside and outside the Oceania region.
- Non-Oceania transmitting stations to contact as many stations as possible inside the Oceania region. There is no penalty for working non-Oceania stations but contacts between non-Oceania stations will score no points or multiplier credits.
- Oceania receiving (SWL) stations to copy as many contest stations as possible both inside and outside the Oceania region.
- Non-Oceania receiving (SWL) stations to copy as many contest stations as possible inside the Oceania region.

5. **BANDS:**

160M – 10M (no WARC bands).

6. **TERMS OF COMPETITION FOR ALL CATEGORIES**

- Only one entry is allowed for each operator or team of operators.
- A different call sign must be used for each entry.
- High power entrants must not exceed 1500 watts total output power, or the maximum permitted output power in their country, whichever is less, on any band.
- QSO alerting assistance (e.g., packet spots) is allowed in all entry categories, but self-spotting, asking other stations to spot you, or any other form of soliciting QSOs is not allowed.
- All of an entrant's transmitters and receivers must be located within a 500-meter diameter circle or within the property limits of the station licensee, whichever is greater. All antennas must be physically connected by wires to the transmitters and receivers used by the entrant.
- Remote operation is permitted. The entry location of a remote station is determined by the physical location of the transmitters, receivers, and antennas. A remote station must obey all station and category limitations.

7. **ENTRY CATEGORIES**

- Single Operator Low Power (SINGLE-OP LP): Either All Band or Single Band. One person performs all of the operating and logging functions. Total output power must not exceed 100 watts. Only one transmitted signal is permitted at any time.
- Single Operator High Power (SINGLE-OP HP): Either All Band or Single Band. One person performs all of the operating and logging functions. Only one transmitted signal is permitted at any time.
- Multiple Operators and Single Transmitter (MULTI-ONE): More than one person can contribute to the final score during the contest period. Only one transmitted signal is permitted at any time. A maximum of ten (10) band changes may be made in any clock hour (00 through 59 minutes). For example, a change from 20 meters to 40 meters and then back to 20 meters counts as two band changes. Use a single serial number sequence for the entire log.
- Multiple Operators and Two Transmitters (MULTI-TWO): More than one person can contribute to the final score during the contest period. A maximum of two transmitted signals is permitted at any time on different bands. Either transmitter may work any and all stations. A station may only be worked once per band regardless of which transmitter is used. The log must indicate which transmitter made each QSO. Each transmitter may make a maximum of eight (8) band changes in any clock hour (00 through 59 minutes). For example, a change from 20 meters to 40 meters and then back to 20 meters counts as two band changes. Use a separate serial number sequence for each band.
- Multiple Operators and Multiple Transmitters (MULTI-MULTI): More than one person can contribute to the final score during the contest period. No limit to transmitters, but only one transmitted signal (and running station) allowed per band at any time. Use a separate serial number sequence for each band.
- SWL: Short Wave Listener (Receive Only), All Band.

8. **EXCHANGE:**

RS(T) report plus a progressive contact serial number starting at 001 and incrementing by one for each contact. MULTI-TWO and MULTI-MULTI entries must use a separate serial number starting at 001 for each band. If the station worked does not send a serial number, then the received number is to be logged as 001.

9. **MULTIPLIER:**

The multiplier is the number of different valid prefixes worked. Note that the same prefix may be counted once on each band for multiplier credit.

A prefix is the letter/numeral combination that forms the first part of the amateur call–the same as the CQ WPX contest definition.

Examples of valid prefixes are N8, W8, WD8, HG1, HG19, KC2, OE2, OE25, etc. Any difference in the numbering, lettering, or order of the same shall constitute a separate prefix. A station operating from a DXCC country different from that indicated by its callsign is required to sign portable. The portable prefix must be an authorized prefix of the country/call area of operation. In cases of portable operation, the portable designator will then become the prefix. Example: N8BJQ operating from Wake Island would sign KH9/N8BJQ or NH9/N8BJQ. KH6XXX operating from Ohio must use an authorized prefix for the U.S. 8th district (W8, K8, etc.) Portable designators without numbers will be assigned a zero (0) after the second letter of the portable designator to form the prefix. Example: PA/N8BJQ would become PAØ. All calls without numbers will be assigned a zero (Ø) after the first two letters to form the prefix. Example: XEFTJW would count as XEØ. Maritime mobile, mobile, /A, /E, /J, /P, or interim license class identifiers do not count as prefixes.

Special event, commemorative, and other unique prefix stations are encouraged to participate. Prefixes must be assigned by the licensing authority of the country of operation.

10. **CONTACT POINTS:**

Each QSO is credited twenty points on 160M; ten points on 80M; five points on 40M; one point on 20M; two points on 15M; and three points on 10M. Note that the same station may only be counted once on each band for contact points.

11. **THE FINAL SCORE** is the sum of the Contact Points multiplied by the Multiplier (the total number of prefixes worked on all bands, noting that the same prefix can be counted once on each band).

12. **AWARDS**

Each station must log a minimum of 10 contacts to be eligible for an award.

Certificates will be awarded to the top scoring station in each category listed under Section 7 for each IARU WAC continent and each country. A special participation certificate will be awarded to every station that makes at least 100 QSOs in either the PHONE or CW sections of the contest.

The trophies and plaques in the following table will also be awarded.

Award	Recipient	Sponsor
OCEANIA Ron Wills ZL2TT Memorial Trophy	Top entrant from Oceania in PHONE Single Operator ALL Band category	ZL2GI, ZL2AL, Wellington Amateur Radio Club and NZART
AUSTRALIA Single-Op ALL Band PHONE Plaque	Top entrant from Australia in PHONE Single Operator ALL Band category	VK3VTH
AUSTRALIA Frank Hine VK2QL Memorial Trophy	Top entrant from Australia in CW Single Operator ALL Band category	WIA Federal
AUSTRALIA Club Plaque	Local club from Australia with the greatest number of member stations participating in the Oceania DX Contest	VK Contest Club
ASIA Single-Op ALL Band PHONE Plaque	Top Entrant from Asia in PHONE Single Operator ALL Band category	VK8PDX (ex-VK5HRT)
ASIA Single-Op ALL Band CW Plaque	Top Entrant from Asia in CW Single Operator ALL Band category	W3SE / ZL3TE
NORTH AMERICA Single-Op ALL Band PHONE Plaque	Top Entrant from North America in PHONE Single Operator ALL Band category	N6RO
NORTH AMERICA Single-Op ALL Band CW Plaque	Top Entrant from North America in CW Single Operator ALL Band category	Oceania Amateur Radio DX Group Inc
EUROPE Single-Op ALL Band PHONE Plaque	Top Entrant from Europe in PHONE Single Operator ALL Band category	Oceania Amateur Radio DX Group Inc
EUROPE Frank Vander Drift VK3COF Memorial Plaque	Top Entrant from Europe in CW Single Operator ALL Band category	VK6DXI

Note: Both Low Power and High Power entries are eligible for the Single Operator ALL Band awards in the above table.
Awards may be withdrawn or added at any time, and at the discretion of the Contest Committee. Refer to the Oceania DX Contest web site at www.oceaniadxcontest.com for the latest information about contest awards.

13. GENERAL LOG REQUIREMENTS:
Transmitting entries are to submit a log showing the following details for each contact–band or frequency, mode, date, time in UTC, callsign of station worked, RS(T) and serial number sent, RS(T) and serial number received. SINGLE-OP Single Band logs are to record ALL contacts made by the station–both on the band chosen for the entry and on any other bands. All logs must be submitted in date/time order.
SWL entries are to submit a log showing the following details for each contact–band or frequency, mode, date, time in UTC, callsign of 'station heard', callsign of 'station being worked', RS(T) and serial number sent by the heard station. The same callsign may appear only once in any group of 3 consecutive entries in the 'station being worked' column. Note that in the case of non-Oceania SWL entries, only Oceania callsigns should appear in the 'station heard' column.
All duplicate contacts must be shown–DO NOT delete duplicate contacts. No penalty will be applied for showing duplicate contacts.
14. ELECTRONIC LOGS are preferred and are compulsory for stations logging more than 50 contacts.
Electronic logs are to be submitted in Cabrillo format. The Cabrillo log file must include an accurately completed header (containing the summary information) and the QSO log data. All of the fields in the Cabrillo header must be completed except for the ARRL Section, Category Overlay and Soapbox lines. Failure to fill out the header correctly can result in the entry being placed in the wrong category or reclassified as a check log. See www.oceaniadxcontest.com for the latest information on the Cabrillo log format requirements.
The log file name is to be in the form callsign.log, for example, if ZL2WB submits a log file–then it should be named zl2wb.log.
Send the log file as an e-mail attachment to ph@oceaniadxcontest.com (for PHONE entries) or cw@oceaniadxcontest.com (for CW entries). Please insert only your callsign in the Subject field of the e-mail used to send your Cabrillo log. The log file must be sent as an attachment, not as text or other content within the e-mail message. Do not zip the log file and only include one log in each email submission.
All incoming email log messages are processed by an email robot. The robot sends an automated email acknowledgement indicating either acceptance or rejection of the log. If you do not receive this acknowledgment, or are encountering difficulty in having the log accepted, then please contact the Contest Committee at info@oceaniadxcontest.com .
Note: SWL files cannot be processed by the robot so please forward all electronic SWL files to info@oceaniadxcontest.com .
Entrants using paper logging, or logging software that does not produce a Cabrillo file, are encouraged to use the on-line forms at http://www.b4h.net/cabforms/ to manually create and submit a Cabrillo file.
15. PAPER LOGS:
Electronic Logs are preferred (see Rule 14 above) but if this is not possible then paper logs in the Oceania DX Contest format may be submitted, provided they contain less than 50 contacts. Each paper log is to be accompanied by a summary sheet that clearly states:
The station's callsign
Operator callsign/s
Entrant's name and mailing address (for receipt of awards)
Mode and Category entered
Contact points claimed on each band
Number of multiplier prefixes claimed on each band
Total claimed score
Official log sheets and summary can be downloaded from the Oceania DX Contest website at www.oceaniadxcontest.com. If you do not have access to the official forms then you may make your own in accordance with the general requirements outlined above and in Section 13.
Paper logs are to be are to be posted to: Oceania DX Contest, c/o Wellington Amateur Radio Club Inc., PO Box 6464, Wellington 6030, New Zealand. Only one entry is to be included in each submission. Airmail is preferred if you are submitting a log from outside VK or ZL.
16. DEADLINE:
All logs must be emailed or postmarked NO LATER than 8 November 2010. The reception of logs will be acknowledged by the email robot (for electronic submissions) and a listing of all logs received by the robot will be posted on the Oceania DX Contest web site at www.oceaniadxcontest.com.
17. DISQUALIFICATION
Violation of amateur radio regulations in the country of the contestant or the rules of the contest; unsportsmanlike conduct; or taking credit for excessive unverifiable QSOs or multipliers will be deemed sufficient cause for disqualification. Incorrectly logged calls will be counted as unverifiable contacts. ANY entrant that uses means, other than contacts on the permitted bands and modes, to SOLICIT, ARRANGE, or CONFIRM any contacts during the contest is unsportsmanlike and the entry will be subject to disqualification.
18. DECLARATION
Although no signed declaration is required, by submitting a log you are deemed to have agreed that: 1) you have read and understood the rules of the contest and agree to be bound by them, as well as all rules and regulations of your country which pertain to amateur radio, 2) your log entry may be made open to the public, and 3) all actions and decisions of the Oceania DX Contest Committee are official and final.
19. FURTHER INFORMATION
The latest information about the contest will be published on the Oceania DX Contest web site at www.oceaniadxcontest.com. Any questions can be emailed to info@oceaniadxcontest.com or posted to Oceania DX Contest Committee, c/o Wellington Amateur Radio Club Inc., PO Box 6464, Wellington 6030, New Zealand.

JOCK WHITE MEMORIAL FIELD DAY CONTEST

This annual contest is named to honour Jock White ZL2GX, NZART Contest and Awards Manager for over 40 years, for the service that he gave to NZART during that time. This contest, like many others, results from Jock's initiatives. Home stations are now valid contacts in this contest and are
encouraged to have a minimum of 50 phone or 25 CW QSOs and to submit a log entry. The minimum numbers apply to the band being used or 50 and 25 on each band if on both bands. This contest is primarily to test Branch organisation and weld a team of workers together. There is work for all members — XYL's, OM's, YL's and SWL's.

Of Special Significance:

1. The term "Branch Points" replaces the more common term "multiplier" in these rules.
   Refer rule 14.2. There is no change in concept, just a name change.
2. The minimum number of contacts for a field station to qualify as "Branch" points for other stations is 50 on Phone or 25 on CW. Refer rule 14.2.4.
3. Restrictions applying to the use of linear amplifiers are given in rule 7.1. Complaints about the use of linear's will be investigated.
4. Team leaders should ensure that all of the team understands the rules and that newcomers are assisted with their operating technique.
5. Stations should be operated within the amateur "codes" as regards procedures, equipment, operating speeds etc.
6. Have you considered entering the QRP section?
7. Rule 15.4 has been amended so that signing of logsheets by the operator is not compulsory. This has been changed because of difficulties in doing this with computer logging. However, it is essential that the operators check the log after their period of operation.
8. Rule 16.2.2 has been amended to include email address alongside of certificate address. Results can be sent to the email address given.

Rules

1. WHEN: The last full weekend in February each year: Saturday 0200 — 1100, 1700 — 2400 UTC. (1500 — 2400 NZT) Sunday 0000 — 0200 UTC (0600 — 1500 NZT).

2. Bands: 40 and 80 metres.

2.1. Simultaneous operation on 80 and 40 metres is permitted provided that only one receiver/transmitter is operational on any one band at any one time. Single receiver/transmitters may be used on one or both bands.

3. Modes and Contacts:

3.1. Modes to be used are phone and CW. Phone to CW contacts are not permissible.

3.2. Home stations will identify themselves as such and field stations will identify themselves as such.

4. Sites/Shelter: All equipment (except generators) to be under the same shelter. For field stations the shelter to be a tent (one or more tents within 10 metres of each other) erected on the weekend of the contest, mobile home or other vehicle (moved on to the site on the weekend of contest).

5. Antennae: for field stations to be raised no earlier than 2300 UTC on the Friday (1200 NZT on the Saturday). This takes into account that some may chose to erect antennae supports while others may use natural or standing supports. eg. hills, trees, towers, buildings etc.

6. Power: for field stations must be from a source independent of the AC or DC mains, ie. all power must be from batteries/ engine alternator/vibrator/solar source/wind generator etc.

7. Contest Sections: One section of the contest may be entered by any one station although that station may qualify for more than one section.

7.1. Open sections: The maximum output power from the transmitter final amplifier must not exceed the legal limit given in the Radio Regulations. Linear amplifiers may only be used to increase the power output of low power transmitters (eg 5 – 30 Watts) to the equivalent of a typical transmitter (ie nominal 100/150 Watts). These sections are for stations in the appropriate region or category. The trophies stated will be awarded to the highest scoring station in the section. Certificates will be issued to the winners of each section plus place getters as warranted by entry numbers.

Field Stations

7.1.1. Northern Region Section (Montgomery Cup)
7.1.2. Central Region Section (Patea Shield)
7.1.3. Midlands Region Section (ZL3/4 Trophy)
7.1.4. Southern Region Section ('4' Trophy)
7.1.5. Single Operator Section – operation unaided by any other person.
7.1.6. CW Only Section – operation on either band or both bands CW only.
7.1.7. Phone Only Section – operation on either band or both bands phone only.
7.1.8. Other Power Section – power source solar, wind generator, water etc.
7.1.9. 80 Metres Only Section – operation on 80 metres only.

Home Stations

7.1.10. Northern Region Section
7.1.11. Central Region Section
7.1.12. Midlands Region Section
7.1.13. Southern Region Section
7.1.14 Overseas Section.

A certificate will also be awarded to the overall highest scoring home station.

7.2. QRP Section (W M Hall Memorial Cup): The maximum output power from the final amplifier of the field station must not exceed 5 watts.

8. Operators. The station should be operated by members of NZART except that operators being introduced to NZART and helpers need not be members. Indicate accordingly on the summary sheet.

9. Mobile Stations: are eligible for contest purposes as field stations for contacts made from within one branch area only. The branch number used will be that of the area where the station is operated.

10. Exchanges:

10.1. The exchange should consist of report and serial number/ branch number. eg. 59001/11 on phone and 599001/11 on CW.

10.2. Serial numbers will commence at 001 and increment by one for each contact.

10.3. Where simultaneous operation is used a separate serial number series will be used for each band.

10.4. Phone and CW numbers on one band are from the same number series.

11. Branch Number: is the NZART Branch number for the area in which the field station is operated except that stations may move a few kilometres from their home area to a suitable location. eg. city to country. Home stations will use the Branch number 00.

11.1. If the field station chosen location is within another Branch area care must be taken not to clash with the other Branch station. The onus is on the 'moved' station to ensure that there is no clash.

11.2. The Branch number of Branches in recess may be used.

12. Contest Periods:

12.1. There will be 18 periods between the even hours. eg. 1500 – 1600, 1600 –1700, etc.

12.2. Contacts may be made with any field, ZL home or 'overseas' (refer rule 13) station once each period on each mode on each band. ie. on 80m: once on phone and once on CW, and on 40m: once on phone and once on CW, each period.

12.3. The contacts with any one station on phone and CW on one band in a period, or on one mode at the end of one period and commencement of the next, may not be sequential except where 5 minutes have elapsed between those contacts.

13. "Overseas" Stations: are those located outside the New Zealand mainland, and in the South Pacific region. The prefixes that are eligible are: all VK, ZL5, 7, 8, 9, A3, FK, FO, FW, H4, P2, YJ, 3D2, 5W.

14. Scoring: The final score will be the total of contact points (80m + 40m) x total Branch Points.

14.1. Contact points:
ZL phone 3 per contact
ZL CW 5 per contact
Overseas phone or CW 10 per contact

14.2. Branch Points (multiplier):

14.2.1. One Branch point is claimed for each Branch contacted on each band and mode. eg. one Branch point for contacting Branch 01 on 80 m phone, two Branch points for contacting Branch 01 on 80 m Phone and 40 m Phone or 4 Branch Points for contacting Branch 01 on 80 m Phone and CW plus 40 m Phone and CW, etc. Enter one callsign in the appropriate summary sheet and total the columns to get a Branches number for summary sheet one.

14.2.2. Only one station from a branch may be claimed as a Branch

point for a mode on one band. However, where a Branch has more than one station active different stations contacted may be claimed for the other band or mode.
14.2.3. Stations using the same Branch number may contact each other for contact points but not for Branch points.
14.2.4. To qualify as Branch points for other stations, a field station must have a minimum of 50 contacts on Phone or 25 contacts on CW on each band that the station is active on. eg. if active on 80 m Phone, must have 50 contacts to count as one Branch point, if active on 80m Phone and CW, must have 50 contacts on phone and 25 contacts on CW to count as two Branch points, etc.

15. Logs

15.1. One log per station in order of time, except that where simultaneous operation is used one log per band is required.
15.2. Head each page with the call, Branch or HS for home station and the page number.
15.3. Log sheet layout order: date/time/station contacted/CW or PH/band/exchange sent/exchange received. NZART log sheets are preferred. Entry in the points column is not required as totals are done from a summary, but the points column can be used for checking purposes. A total of PH/CW/DX contacts on each page is useful for counting purposes.
15.4. Use a separate logsheet per period, except that where there are very few contacts per period, several periods (ruled off between periods) can be on one sheet.
15.5. Highlight or underline each contact claimed as a multiplier.
15.6. Check for accuracy and rule through any duplicate contacts in a period.

16. Summary.

16.1. The summary and final score details are to be on the 'Jock White Memorial Field Day' summary forms provided to Branch secretaries each year and also available from NZART HQ and the NZART website <http://www.nzart.org.nz/nzart/update/ contests>.
16.2. Summary Sheet 1 contains:
16.2.1. Callsign used Branch name & number or HS for home station
16.2.2. Postal address for certificates and email address for results
16.2.3. Section entered (one only)
16.2.4. Names & Calls of operators/assistants
16.2.5. No. of 80 m phone contacts
No. of 80 m CW contacts
No. of 80 m overseas contacts
16.2.6. No. of 40 m phone contacts
No. of 40 m CW contacts
No. of 40 m overseas contacts
16.2.7. Calculation of contact points
16.2.8. Branch points claimed for 80 phone
Branch points claimed for 80 CW
Branch points claimed for 40 phone
Branch points claimed for 40 CW
Total Branch points
16.2.9. Total points claimed (contact points x total Branch points)
16.2.10. List transceivers/generator etc/power output
16.2.11. Certification of power output and rule observance by two operators (except for single operator stations)
16.3. Summary Sheets 2 and 3 contain a table for listing the CALLSIGN of the station claimed as a Branch point for each branch on each band and mode. Count the number in each column and transfer the figure to summary sheet 1.

17. Closing Date: Logs should be posted to reach Stuart Watchman, 33 Brooklyn Drive, Blenheim by the Saturday which is four weeks after field day Saturday. eg. If Field Day is held February 23/24, logs to be received by 24 March (in a non – leap year). Late logs will not be eligible

NZART MEMORIAL CONTEST

To commemorate those New Zealand amateur radio operators who lost their lives in World War 2.

1. When:

First weekend in July, 2000 – 2300 NZST Saturday and Sunday. Three one-hourly operating periods each evening.

2. Bands:

80m only–A station may be contacted twice during each operating period – once on phone and once on CW provided that contacts are not consecutive.

3. Operator Categories:

Single-operator CW only, Phone only, or both CW & Phone and SWL

4. Exchange:

RS(T) report plus a three digit serial number starting at 001 for the first contact and incrementing by one for each subsequent contact.

5. Scoring:

A. Contact points:
Phone – One point per contact
CW – Two points per contact

B. Multipliers:
Each different callsign prefix worked, Phone and CW is a multiplier. (eg. a ZL4 worked on both Phone & CW counts as two multipliers).

C. Scoring:
The final score is the sum of the contact points multiplied by the number of different multiplier prefixes worked.

6. Logs:

The official log sheets can be downloaded from NZART web site and are also available from the NZART Business Manager. Logs must show contacts in correct order of time. Do not group all ZL1, ZL2, ZL3 etc. contacts together.

7. Summary Sheet:

A separate summary sheet, also available from the NZART web site, must be completed and attached to the log sheets. This must show the following:

A. Callsign of station and NZART Branch of which a member.
B. Name and full address of operator.
C. Section in which competing:
- Open phone and CW (Memorial Trophy),
- Open CW only (Auckland CW Cup),
- 'Beginners' CW only (Laing-Smith Cup). Competitors in this section must state the number of their operator's certificate and the date of issue,
- Low power phone and CW (Mannell Trophy),
- Home-made SSB equipment (Brother John Rodgers Plaque),
- Phone only (Phil Armstrong Plaque),
- Listeners section: Rules as for the transmitting sections except that only the exchange sent by that station heard should be given. The callsign of the station heard and also of the station being 'worked' must be stated.
- Australian section: Rules as for the Open section.

D. Brief description of equipment used and power output.
E. Points Summary:

	CONTACTS		CONTACT POINTS		NUMBER OF PREFIXES		
PHONE		X1=					
CW		X2=					CLAIMED SCORE
TOTALS				X		=	

Plus a list of prefixes worked
F. Signed declaration that the contest rules and Radio Regulations have been observed.

8. Log Submission:

All logs with summary sheets should be sent to NZART Contest Manager, Frank Hunt ZL2BR, 8 Manu Crescent, New Plymouth 4310, to arrive no later than four weeks after the contest date. Logs as email attachments in either Word, Excel or plain Text format sent to zl2br@ihug.co.nz are also accepted.

9. Trophies:

Memorial Trophy

Donated by NZART in 1946. To be held for 12 months by the competitor with the highest score. Phone and CW may be used but contacts must be phone to phone or CW to CW. Phone to CW

or vice versa is not permitted. A miniature is also awarded with the trophy, becoming the winner's personal property.

Auckland Shortwave Cup

Donated by the Auckland Shortwave Club in 1933 for Morse competitions. To be held for 12 months by the competitor operating CW only, who returns the highest score. Contacts must be CW to CW. Power limit is 150 Watts.

Laing-Smith Cup

Donated by Mr L E Laing-Smith ZL1BO in 1958. To be held by the competitor returning the highest CW score who, at the time of the contest, has held an amateur operator's certificate for no longer than 12 months. Contacts must be CW to CW. Power limit is 150 Watts. This is to encourage CW operation amongst new hams. To quote ZL1BO 'Any method of inducing or encouraging the new hams to use CW until they are at least proficient' has my support.

Mannell Trophy

Donated by Mrs Mannell in memory of her son, who was killed in an aircraft accident while serving with RNZAF. To be held for 12 months by the competitor using a power not exceeding 10 Watts who returns the highest score. Phone and CW may be used but contacts must be phone to phone or CW to CW.

Ron Gray Memorial Shield

Presented by Mr And Mrs D Gray and Jock White ZL2GX in memory of Ron ZL1304, who was a regular competitor in the Listeners' Section, for the highest SWL score.

Brother John Rodgers Memorial Plaque

Presented by a group who appreciated his contribution to the hobby. For the competitor with the highest score using home-brew SSB transmitting equipment.

Phil Armstrong ZL1BMC (VK7MC) Memorial Plaque

To be held on an annual basis by the competitor with the highest score on phone only. All contacts must be phone to phone

NZART SANGSTER SHIELD CONTEST

Presented to the amateurs of New Zealand by Mr R. Sangster in 1927, the Sangster Shield is for annual competition to be won by the most efficient station. In this respect it should be pointed out, that in addition to the efficiency of the equipment used, the efficiency of the operator is of the utmost importance. To win this contest marks an operator as one who not only knows how to obtain the most effectiveness from low power but also one who is most proficient in the art of telegraphic communication.

Rules

1. **When:**
   Third full weekend of May each year, between the hours of 2000 NZST and 2300 NZST on each evening. The maximum period of operation will be six hours.
2. **Power:** To compete for the Sangster Shield and Trophies the output of the transmitter must not exceed 5 Watts.
3. **Mode:** CW only
4. **Band:** 80 m only

- To give QRP contestants a fair chance (particularly with DX stations) higher power stations are requested to operate above 3530 kHz

5. **Exchange:**

- RST followed by branch number followed by power output – eg 569/11/04. indicating a 569 report; branch 11; and power of 4W. Power will always be given as two figures: over 100W will be given as 99, while below 10W will be preceded by 0.
- Overseas stations are required to give RST plus a serial number beginning at 001.

6. **Contacts:**

- Valid contacts are those between two ZL stations or between ZL and overseas stations, contacts between two overseas stations are invalid.
- QSOs with any one station are permitted once only each half hour, based on an "even half hour" basis, eg 2000 to 2030, 2031 to 2100 etc.
- It is not permissible to claim QSOs with the same station "twice running", i.e. at the end of one half hour period and at the beginning of the next, unless a different station is contacted by one of the two stations between QSOs, or a time delay of at least five minutes elapses between QSOs.

7. **Entrants:**
   All ZL entrants must be financial members of NZART, except for first time entrants qualifying for the Transistor Trophy.
8. **Logs:**

- A4 size paper – preferably NZART log sheets.
- Data in this order: Date, Time, Station Call-sign, Exchange Sent, Exchange Received, Points Claimed.
- On a separate sheet a summary to show:
  Entrant's callsign, name and address in BLOCK LETTERS.
  Number of contacts with stations using 5W or less.
  Number of contacts with stations using 6W or more.
  Number of contacts with overseas stations.
- List of different branches worked with the number and name of each branch as given in the Call Book (in branch number order) plus the callsign of the station claimed for that branch.
- Total score – (total points multiplied by the number of branches worked).
- Description of equipment, antenna and output power used.
- Signed declaration that all contest rules have been observed.

9. **Scoring:**

For ZL stations:

ZL to Overseas – 10 points
ZL to ZL with Power given as 5 W or less – 5 points.
ZL using 5W or less to ZL with Power given as 6W or more – 1 point
ZL using 6W or more to ZL with Power given as 5W or less – 1 point
ZL using 6W or more to ZL with Power given as 6W or more – not permitted for contest purposes.

For Overseas stations:

Overseas using 5W or less to ZL with Power given as 5W or less – 10 points.
Overseas using 5W or less to ZL with Power given as 6W or more – 5 points.
Overseas using 6W or more to ZL with Power given as 5W or less – 5 points.
Overseas using 6W or more to ZL with Power given as 6W or more – not permitted for contest purposes.

10. **Final score:**
    Total points multiplied by the Number of Branches worked. Note: Contacts with a Contestant's own Branch are OK for points but are not to be counted as a multiplier.
11. **Mobile or Mobile/Portable operation:**
    Will be permitted for New Zealand stations, however, the station must be operated from one location each evening. This means a station could operate from one location the first evening and another location on the second evening. The station must use the Branch number applicable to its location at the time. The entrant may combine both logs for contest purposes, but the logs must indicate their locations on both evenings. In this case then only one branch (either) is to be eliminated as an "own Branch" multiplier.
    Overseas Stations may be mobile or portable, but a maritime mobile station must be outside New Zealand's territorial waters to be counted as a DX contact.
12. **Discounted Contacts:**
    It is expected that participating stations will provide a fair chance for all entrants to make contact with them. While it is not intended to discourage contestants from operating only part of the full contest it is considered that at least 20 contacts should be made and station operation should be over at least three half-hour operating periods. Stations considered to have worked less than this requirement will have their contacts and branch multiplier contribution deducted from contest logs.
13. **Awards:**

Sangster Shield: to the highest scoring entrant using 5W or less and observing the rules as enumerated. (Note that all first time entrants qualifying for the Transistor Trophy will also be eligible for the Sangster Shield Award)

Transistor Trophy: to the highest scoring entrant using 5W or less and observing the rules as enumerated, but in addition who has

been licensed for 12 months or less. Entrants must give Operator's Certificate number together with date of issue.

Arthur Stevens Trophy: will be presented to the highest scoring South Island entrant using 5W or less. (This trophy is in honour of Arthur, formerly ZL1MT, a very long time stalwart of the Sangster Shield Contest).

- Certificates to the first three entrants using 5W or less, also to the first three "newly licensed" entrants qualifying for the Transistor trophy.
- Certificate to entrant using 6 W or more with the highest score.
- Certificates to Overseas entrants with the highest score in their respective call areas.
- Certificate to the branch with the highest aggregate score from three entrants operating in the QRP section. A minimum of three entrants are required to be eligible for this section. The top three scoring entrants for any Branch will automatically be aggregated – it is not necessary for a Branch to send in an entry for this section.

14. Logs:
Must be posted to reach the Contest Manager, Glenn Kingston ZL2KZ, 53 Tannadyce Street, Wellington 6003, on or before the third Thursday of June.

WAITAKERE SPRINTS CONTEST

The Papakura Radio Club Inc. is pleased to announce that the Waitakere Sprints will continue. The Sprints will be the same at previously held, the Phone Sprint will be on the last Saturday in July and the CW Sprint will be on the first Saturday in August. The Sprints are of one-hour duration on 80m, and are open to all licensed amateurs in ZL, VK and Oceania call areas.

Object of the Sprints: The operator's basic goal in the sprints is to make as many contacts as possible, without duplication, during an hour of operation on a single band. Any contact with ZL, VK or Oceania stations on 80m during the contest period can be counted, but a station may be claimed only once.

Eligibility: The Waitakere Sprints are open to all licensed amateurs anywhere in the ZL, VK and Oceania call areas. SWL logs will also be welcome. 2008 Contest Periods
Phone 1000 to 1100 UTC, on Saturday 26th July
CW 1000 to 1100 UTC, on Saturday 2nd August
Frequencies
Phone: 3.550 to 3.700 may be used.
CW: 3.500 to 3.550 may be used.

Power: In fairness and consideration to others NO LINEAR AMPLIFIERS are to be used during the contest.

Contest call: CQ Contest, CQ Sprint or CQ Test.

Awards: Certificates will be awarded to the overall winner and to the best score in each ZL call area and to the best three scores from VK/ Oceania.

Special Award: To encourage contestants to enter both Sprints we have decided to issue a Special Certificate to the entrant with the Highest combined score. The method of calculation will be: (Phone points + CW Points) x 2. All logs received will be considered for this award. To qualify for the multiplied points each log must contain a minimum number of valid contacts. ie. Ten (10) for Phone and Five (5) for CW.

Logs: A separate log must be submitted for each Sprint and must be clearly marked PHONE or CW. Contest logs must show for each contact:- Date, Time, Callsign of station worked, Signal report and serial number sent, Signal Report and serial number received. SWL logs must show both Callsigns in the QSO also both Signal Reports and serial numbers. Logs are to be in the hands of the Manager, Waitakere Sprint by 1 September.

Sample Log

Date	Time	Station Worked	Report and Serial Sent	Report and Serial Received	Points

Postal address: Manager Waitakere Sprint, PO Box 72 397, PAPAKURA 2244
Email is the preferred method of log receipt. A Plain text file named (yourcallPh.txt or yourcallCW.txt) with a tab or space between each column. Email to prc@ihug.co.nz An email confirming receipt of logs will be sent as logs are received.
Closing Date For Logs: No later than 1st September.
Operator Information: Each log must show the following details: Mode, Callsign, Name, Address,
Operating area (Eg. ZL1,ZL2,VK, Oceania), Total Number of contacts claimed
A declaration that the operator has abided by the rules and spirit of the contest. Any entry which is clearly in violation of the rules or spirit of this contest or which contains an excessive number of duplicate contacts (this does not refer to duplicates which have been indicated as such and are not claimed) may be disqualified. The decision of the Waitakere Sprint Manager in respect of interpretation of these rules, the granting of awards and disqualifications will be final and no correspondence will be entered into.

NZART STRAIGHT KEY NIGHT

Polish and lubricate that old morse key and enjoy an evening of old time radio fun. An activity night in which everyone can be a winner with a certificate to prove it.

When: First Sunday in November 2000–2300 NZST.

Band: 80 m (3.5 MHz) only.

Mode: CW sent with straight key i.e. characters formed manually, no system of automatic dots, dashes or spacing permitted.

Divisions: Vintage QRP, Vintage QRO, Open QRP, Open QRO.

Explanation: Vintage: Receiver and transmitter or transceiver using valves, no solid state devices in the signal line permitted. QRP: 5 watts or less RF output.

Exchange: RST/QTH/operator's name (one word)/key used (e.g. ZC1, P&T)/TX type (eg ZC1, FT1000, homebrew)/TX power (watts). Except for DX stations (i.e. non ZL mainland) only rst, operators name, and QTH need be exchanged.

Scoring: 1 Point per QSO. Stations may be worked once, CW to CW only. All stations submitting logs must use a straight key throughout, but straight key stations may QSO stations using bugs, electronic keyers or keyboards.

Multipliers: Multiply total points as follows: Vintage QRP x2, Open QRP x1.5, Vintage QRO x1.2, Open x1.

Logs: Each log QSO entry to show: Time (NZST or Z), callsign, RST, QTH, name, key type, Tx type, Tx power (of station worked). Calculate total score, multiply to give total score claimed. Logs to have associated data sheet giving entrant's: name, call-sign, QTH, age (optional), full description of equipment used, ie. key, Tx/Rx, Tx power, antenna.

Send logs by email, mail, fax, on or before November 20 to: Ken McCormack ZL1AIH, 181 Ararimu Valley Road, Waimauku, Auckland or E-mail address <zl1aih@xtra.co.nz>.

Certificates will be sent to the top three stations in each Division (including DX entrants who send in logs). All other entrants will receive a personalised certificate if an A4 self-addressed envelope is sent to the Straight Key Night manager. Any photos of operators and/ or equipment gratefully received. There are five contests which are spaced over the period of a year. The contests are during Saturdays and Sundays, with 1 hour contest periods occurring from 1600 to 2200 on the Saturday and 0800 to 1400 on the Sunday.

NOSTALGIA NIGHT CONTEST

Haul out that old equipment, dust off the cobwebs, check it over and join in a night of nostalgia and fun. This year's contest will be in three sections, catering for the varied interests within the old equipment ranks.

1. QRP
2. Military
3. Open

The overall winner shall be the entrant having the highest points score which will be published in the following Break-in.

WHEN:
Second Saturday each September
Four operating periods – each half an hour
Local ZL time:
1930-2000 hrs
2000-2030 hrs
2030-2100 hrs
2100-2130 hrs

EQUIPMENT:
Any rig of the past that uses thermionic valves, be it home made, of military origin, commercial or amateur, no solid state or ssb type equipment is acceptable for this event.

CYPHER
Rs(t) Plus branch number.

POINTS:
Three points for AM phone to AM phone QSO. Six points for CW to CW QSO. Only AM and CW contacts are valid for this competition.

MULTIPLIER:
Each NZART branch worked (e.g. Ten branches worked overall and thirty contacts: 10x30=300, not 10 branches each period)
ZL1 to ZL3 or ZL4 or reverse multiply by 1.2
ZL2 to ZL4 or reverse multiply by 1.2

TOTAL POINTS
QSO points multiplied by number of branches.
BUT
1. QRP section-if your rig is 5w or less input, then multiply your score by 1.5
2. If your rig is of military origin i.e. ZC1, ARC5, 19 SET, then multiply your score by 1.2
3. Open section – if your rig is other than 1 or 2 but within the power limit no multiplier (the power limit is the legal power limit). BUT Only one multiplier may be chosen (e.g. military OR QRP – not both).

Repeat QSOs:
These are permitted each operating period on phone and cw, but no consecutive contacts with the same station.

LOGS:
Send to: Nostalgia Contest, Mike Digby-Smith ZL1MDS, 6 Baird Ave, Te Kauwhata within seven days with the following data
1. Number of QSOs on CW.
2. Number of QSOs on AM phone
3. Number of different branches worked
4. Score claimed (points x branches).
5. Overall score claimed (points in 4 multiplied by section 1 or 2 as applicable)
6. Details of equipment used for the event.
7. Any comments about event or suggestions
8. Do not send a copy of your log or contacts just the above information.
9. Have a lot of fun on the night.

Mike Digby-Smith ZLIMDS mikeds@callsouth.net.nz &Barrie Vivian ZL2LA

BOAT ANCHOR SPRINT RULES

This is in two sections:

Section 1: Old radios – all valves – i.e. ZC1, 19 set, Heathkits, any home brew set, but must have all valves.

Section 2: Any Hybrid transceiver (must have valve finals i.e. FT200, FTDX400/401, Drake, FT 101s, etc.

Amplitude Modulated signals only.
The overall winner shall be the entrant having the highest points score which will be published in the following Break-in.

WHEN:
The second Saturday each February, April, June, August, October.
One operating period Local ZL time: 2000 to 2100 hrs

CYPHER:
RS

POINTS:
One point for phone to phone QSO. No repeat QSO's:
Stations may be worked a maximum of once on AM phone.
There will be no multipliers.

LOGS:
Send to: Boat Anchor Sprint, Mike Digby-Smith ZL1MDS, 6 Baird Ave, Te Kauwhata within seven days with the following data
1. Number of QSO's
2. Overall score claimed
3. Details of equipment used for the event.
4. Any comments about event or suggestions
5. Do not send a copy of your log or contacts just the above information.
6. Have a lot of fun on the night.

NZART DOUG GORMAN MEMORIAL FREQUENCY MEASURING CONTEST

When?
First Monday in September at 2115 NZST (0915 UTC)
This year the contest will blend the old school rules with some improvements suggested by contestants, in particular Papakura Branch and Murray ZL1BPU, along with observations made by past contest organizers Gavin ZL2ACT and Neil ZL2TNG. Please read the rules carefully as there are some key changes to the format.

1 Listen to ZL6A on 3895 kHz LSB for instructions on the frequencies that will be used and the procedure to be adopted. Following the voice instruction an unmodulated carrier will be radiated on 3895 kHz for calibration and/or practice.
The contest itself will start at 2115 on the first frequency for five minutes, and every five minutes on a new frequency, for a total of five frequencies. All transmissions will be made within ±5kHz of 3895 kHz. Individual transmission start times may be delayed slightly due to equipment setup and adjustment.
Each transmission will be identified in 10 wpm Morse (CW) for about three minutes to allow the frequency to be located and will then remain key-down for the remaining minutes. At the end of the five minute period the transmission will cease. For station competing in the Ultra Category (see below) only the last 10 seconds of carrier should be measured.

2 Read each frequency as accurately as possible. To qualify for an award it is essential to read at least three frequencies.

3 Post your entry to: Doug Gorman Frequency Measuring Contest, NZART, P0 Box 40-525, Upper Hutt.

4 Entries should be sent within seven days, together with details of equipment used and which section entered (John McKim Cup, Norm Edwards Shield, or Ultra Category).

5 **Results:** Participants may nominate which of the five frequencies they measured should be considered in their average score, with a minimum of three. The degree of accuracy will be judged by subtracting measurements from the actual transmit frequencies and averaging the nominated results.

6 **Awards:**
John McKim Cup for those using simple direct reading type

of equipment. This includes a receiver using a calibrated dial or digital readout of kilohertz to one decimal place (100 Hz), or a simple commercial or homemade heterodyne type frequency meter (BC221, LM-10, etc).

Norm Edwards Shield for those using more sophisticated equipment. This includes receivers with digital readout of kilohertz to two or more decimal places (10 Hz or better) and computer methods, oscilloscopes, generators, etc, typically referenced to a local frequency standard (TCXO or ovened oscillator).

Ultra Category for measurements directly referenced during the contest to an atomic standard or GPS disciplined oscillator. This does not include off air calibration to WWV, etc, during the contest.

Branch Award certificate to the branch with the lowest average of the three best competitors. If you wish to support your branch, state you branch number and name on your entry form.

Certificates will be provided to all entries with an average deviation of 100 Hz or better.

If you make readings during this activity, but do not wish to have your results published, or if you wish to comment please drop the contest organizers a line so we know how many people were interested.

73, *de John ZL4JY*

Doug Gorman Memorial Frequency Measuring Contest Entry Form

Name _____ Call-sign _____ Branch _____

Details of all equipment used:

Make _____ Model _____

Comments _____

Section entered (please tick):

☐ John McKim Cup ☐ Norm Edwards Shield ☐ Ultra Category ☐ Branch Award

Measured Frequencies:

1. _____ kHz 2. _____ kHz 3. _____ kHz 4. _____ kHz 5. _____ kHz

Post entry to: Frequency Measuring Contest, NZART, P0 Box 40~525, Upper Hutt

VHF-UHF-SHF CONTEST RULES

These are the rules for VHF-UHF-SHF Contests, as administered by the Wellington VHF Group. A PDF edition (130K) is also available at http://www.vhf.org.nz/pubs/Contests/VHF-UHF-SHF-ContestRules-February2010.pdf.
Rules effective from February 2010.

CLAUSE 1. Contest dates

DX Weekend Contest
All bands 50 MHz and up. First Saturday in February, and the following day.

Low Band Contest
All bands 50 MHz to 440 MHz. First Saturday in April, and the following day. Delayed one week if it clashes with VHF Convention, or Easter.

Hibernation Contest
All bands 50 MHz and up. First Saturday in June, and the following day. Delayed one week if it clashes with NZART Conference.

Brass Monkey Contest
All bands 50 MHz and up. First Saturday in August, and the following day.

Microwave Contest
All bands 614 MHz and up. First Saturday in October, and the following day.

Field Day Contest
All bands 50 MHz and up. First Saturday in December, and the following day.

For all contests, the operating periods are 1700 to 2300 on the Saturday, and 0700 to 1300 on the Sunday, NZ local time.

CLAUSE 2. Definitions

QRP shall mean a transmitter operating at an output power of 5W or less.

A Field Station is one where all equipment, including power sources, antenna systems and operating shelters are taken to the site, and no other facilities are used.

Light. Electronic signal generation, modulation and detection, shall be used on all bands, including between 400 THz and 750 THz (light).

CLAUSE 3. Crossband or repeater contacts

Crossband contacts, or contacts through repeaters, are invalid in these contests.

CLAUSE 4. Time

All contest periods begin and end on the hour. Use time signals from a reliable source.

CLAUSE 5. Operation site

Stations may use only one site for the duration of the Contest, but may move to shelter within one kilometre. Any greater move requires a scoring restart. Two, or more, stations in close proximity may only participate if the stations are erected and operated entirely independently throughout the Contest.

CLAUSE 6. Teams

Team operation is advisable on field sites, for safety. No member of a team that has set up and operated a station may earn points for that station by making contact with that station.

CLAUSE 7. Call-signs

Only one call-signs may be used by a station for the duration of the Contest.

CLAUSE 8. Repeat contacts

No station may be worked twice in a period on the same band, nor may consecutive contacts be made on that band to the same station, bridging a period change, unless the other station has worked a third station, if available, in the interim. There shall be a period of, at least, 5 minutes between contacts, if a third station is not available.

CLAUSE 9. Contact Serial Numbers

Contacts must be fully two-way. Serial numbers must be correctly exchanged and acknowledged, before points may be claimed. The serial number is made up of RS(T) plus a three digit number.

CLAUSE 10. Station location

Location details of contesting stations must be exchanged on first contact with each new station, especially if mobile, and entered into

the log. Stations shall give their location as latitude and longitude, using the NZ1949 Geoid, to within five minutes resolution or full Maidenhead Locator. As the full Maidenhead is only accurate to 7 km, station location shall be given to within 30 seconds resolution, approximately 0.9 km for contacts above 2.4 GHz. "Christchurch" or "Home station" is an insufficient description. The station giving the insufficient description will be penalised.

CLAUSE 11. Logs

Contest logs must reach the VHF/UHF/SHF Contest Manager, Wellington VHF Group, PO Box 12-259, Thorndon, Wellington, within two weeks of the contest, and must contain:

(a) A certificate signed by the chief operator, stating that the station was operated in accordance with the Radio Regulations and these contest rules.
(b) A list of all operators and call-signs.
(c) The station call-sign and operating site, accurately described. Please include an email address for correspondence and a postal address for certificates.
(d) Power of each transmitter used.
(e) Optional supplementary information on conditions and/or equipment used, for publication. This is of value to other contestants, and to the contest organisers.
(f) Separate log sheets for each contest section, in each band, single-sided, showing the following:
  (i) Heading, showing Section, Band, Contest, Date.
  (ii) Time and (other) station call-sign, for each contact.
  (iii) Serial numbers exchanged.
  (iv) Other station location (first contact).
  (v) Distance in kilometres to other station.
  (vi) Claimed score for each contact.
  (vii) Running score per sheet, total for band, with any bonus points. Each section, on each band, is a mini-contest, please log them that way.
(g) An email address for results, if you don't want to wait until the results are published in Break-In, HQ InfoLine, Q-Bit and Spectrum.
(h) Check logs are welcome.

CLAUSE 12. Scoring

You must score your own log, as detailed below.
For ease of scoring, the use of a map with a scale of one to one million, such as InfoMap 265, or similar, is suggested. At this scale 1 mm = 1 km.

Table 1 – Basic scores

- 48 cm 0.3 points per kilometre
- 32 cm 0.3 points per kilometre
- 23 cm 0.2 points per kilometre
- 13 cm 0.5 points per kilometre
- Above 3 GHz, one point per kilometre
- Round the points per contact to the nearest integer:
- Less than 0.5 rounds down; 0.5 and above rounds up.

CLAUSE 13. Bonus Multipliers (in order of application)

There are no multipliers for "manual" modes such as: CW, AM, SSB, FM and digital voice, etc.
Multiply the basic score by 1.5 for "machine" modes such as: RTTY, ASCII, AMTOR, Packet, SSTV, ATV, etc.
QRP. Multiply previous score by 1.5. Stations may use QRP on some modes, and/or bands, and high powers on others, with multipliers calculated on a contact by contact basis. The establishing of a contact on high power, then reducing the power for scoring purposes, is not permitted.
Field Station, as defined in Section 2 of these Rules–multiply previous score by 1.2.

CLAUSE 14. Discussion

The ruling of the Contest Committee is final, and no discussion will be entered into.

June 2006 Edition Updated to February 2010; Change notes the Low Band contest may be deferred by 1 week if it clashes with Easter, as well as with the VHF Convention. This is as promulgated in the NZART Infoline on Sunday, 7 February 2010.

INTERNATIONAL HF CONTEST CALENDAR

Weekend	UTC	Mode	Contest	Sponsor
January				
first	1800 Sat–2400 Sun	RTTY	ARRL RTTY Round-up	ARRL (USA)
second				
third	1200 Sat–1200 Sun	CW/SSB	HA DX	MRASZ (Hungary)
fourth/last	1200 Sat–1200 Sun	RTTY	BARTG Sprint	BARTG (UK)
	0000 Sat–2400 Sun	CW	CQ WW 160m	CQ Magazine (USA)
	0600 Sat–1800 Sun	CW	REF CW	REF (France)
	1300 Sat–1300 Sun	SSB	UBA SSB	UBA (Belgium)
February				
first				
2nd	0000 Sat–2400 Sun	RTTY	CQ WPX RTTY	CQ Magazine (USA)
	1200 Sat–1200 Sun	CW/SSB	PACC	VERNON (Netherlands)
3rd	0000 Sat–2400 Sun	CW	ARRL International DX CW	ARRL
4th	0000 Sat–2400 Sun	SSB	CQ WW 160m	CQ Magazine (USA)
	0600 Sat–1800 Sun	SSB	REF SSB	REF (France)
	1300 Sat–1300 Sun	CW	UBA CW	UBA (Belgium)
March				
1st	0000 Sat–2400 Sun	SSB	ARRL International DX SSB	ARRL
2nd	1000 Sat–1000 Sun	CW	BERU	RSGB (UK)
3rd	1200 Sat–1200 Sun	CW/SSB	RDXC	
	0200 Sat–0200 Mon	RTTY	BARTG Spring	
4th/last	0000 Sat–2400 Sun	SSB	CQ WPX SSB	CQ Magazine (USA)

April				
1st	1600 Sat–1600 Sun	RTTY	EA RTTY	URE (Spain)
	1500 Sat–1500 Sun	CW/SSB	SP DX	PZK (Poland)
2nd	0700 Sat–1300 Sun	CW	JIDX CW	
3rd				
4th	1200 Sat–1200 Sun	RTTY	SP RTTY	PZK (Poland)
May				
1st	2000 Sat–2000 Sun	CW/RTTY	ARI International	ARI (Italy)
2nd	1200 Sat–1200 Sun	RTTY	VOLTA	
3rd				
4th/last	0000 Sat–2400 Sun	CW	CQ WPX CW	CQ Magazine (USA)
June				
1st				
2nd				
3rd	0000 Sat–2400 Sun	CW	All Asian DX CW	JARL (Japan)
4th				
July				
1st	1100 Sat–1100 Sun	RTTY	DL DX RTTY	
2nd	1200 Sat–1200 Sun	CW/SSB	IARU WW	ARRL (USA)
3rd				
4th	1200 Sat–1200 Sun	CW/SSB	IOTA	RSGB(UK)
August				
1st				
2nd	0000 Sat–2400 Sun	CW	WAE CW	
3rd	0000–0800 Sat 1600–2400 Sat 0800–1600 Sun	RTTY	SARTG	SARTG (Scandinavia)
4th	1200 Sat–1200 Sun	RTTY	SCC	
September				
1st	0000 Sat–2400 Sun	SSB	All Asian DX SSB	JARL (Japan)
2nd				
3rd	1200 Sat–1200 Sun	CW	SAC CW	
4th/last	0000 Sat–2400 Sun	RTTY	CQ WW RTTY	CQ Magazine (USA)
	1200 Sat–1200 Sun	SSB	SAC SSB	
October				
1st	0800 Sat–0800 Sun	SSB	Oceania SSB	NZART/WIA
2nd	0800 Sat–0800 Sun	CW	Oceania CW	NZART/WIA
	0700 Sat–1300 Sun	SSB	JIDX SSB	
3rd	1500 Sat–1500 Sun	CW	Worked all Germany (WAG)	DARC (Germany)
	0000 Sat–2400 Sun	RTTY	JARTS	
4th/last	0000 Sat–2400 Sun	SSB	CQ WW SSB	CQ Magazine (USA)
November				
1st	1200 Sat–1200 Sun	CW/SSB	Ukrainian	
2nd	0000 Sat–2400 Sun	RTTY	WAE RTTY	DARC (Germany)
	0000–2400 Sun	CW	OK/OM	
3rd	1200 Sat–1200 Sun	CW/SSB	LZ	
4th/last	0000 Sat–2400 Sun	CW	CQ WW CW	CQ Magazine (USA)
December				
1st				
2nd	0000 Sat–2400 Sun	CW/SSB	ARRL 10m	ARRL (USA)
3rd	0000–2400 Sat	RTTY	OK RTTY	
	1400 Sat - 1400 Sun	CW	9A Croatian	
4th	0200 - 1000 Sun	CW	RAEM	

NZART BRANCH AWARDS

by Alan Chapman ZL2TJ

Aotearoa Postcode Award

This award has been presented to stimulate awareness and the use of postcodes in the New Zealand postal system — at least by the amateur fraternity.

To some extent it is a sister award to the Australian Amateur Radio Postcode Club.

1. The award is open to all Amateurs and SWLs.
2. All contacts made on or after 20 October, 1991, will be eligible for the award.
3. A certificate will be issued for basic qualification, and stickers for the various following upgrades.
4. Portable and mobile stations must give the postcode for the particular area they are in and can claim that postcode for the award.
5. Basic Award: Make contact with ZL stations and obtain their QTH and Postcode. Then use the suffix letters of the station claimed to complete the following phrase — AOTEAROA LAND OF THE LONG WHITE CLOUD.
   Each letter of a call-sign may only be used once unless that station is contacted in a different postcode area. Claim each postcode once only.
6. Upgrades: Stickers will be issued as follows: Postie — 100 different postcodes; Mail Officer — 150 different postcodes; Supervisor — 200 different postcodes; Branch Manager — 250 different postcodes. (There is provision for an extension for the enthusiast.)
7. All amateur modes and bands may be used. Repeater contacts accepted.
8. Cost: Basic certificate —

ZL stations	$3.00
VK stations	US$2.00
DX stations	US$3.00

   Upgrades — ZL stations SASE plus $1.00 for first — SASE for other three. VK Stations SASE plus $1.00 stamp for each upgrade. DX stations SAE plus US$1.00 for each upgrade.
9. On application send a log with the following: date of contact, station contacted, postcode number, and area to Awards Manager, 48 Leslie Street, Waitara 4320.

As NZ Post revamped the system in July 2006, all old numbers will be accepted for contacts made up to 31 August 2006. From 1 July 2006, the new numbers are acceptable.

Bay of Plenty Award — Series 2

Sponsored by the Tauranga Branch 39 of NZART for working stations in the Bay of Plenty region — ie, Opotiki, Rotorua, Tauranga and Whakatane Counties and all cities and districts within this region.

ZLs need either 10 stations on any band or five stations on 50 MHz or higher.

The rest of the world need five stations on any band.

All stations to be in different Maidenhead Locator sub-squares, since January 2006.

This award is available to Listeners on a "heard" basis. Applications with $4.00 (overseas US$5.00) with check-list showing station, date and time, worked mode and band (QSLs not required) to Secretary Tauranga NZART, C/- Emergency Management Office, WBOP District Council, Private Bag 12 803, Tauranga Mail Centre, Tauranga 3143.

Christchurch Award

Requirements

Christchurch amateurs (those within the normal coverage of the 705 repeater) 25 different stations; rest of ZL — 15 stations; VK — 10 stations; rest of world — five stations. Definition of a Christchurch station that may be worked for this award is any station that is operating from within the metropolitan area of Christchurch. Cost: ZL and VK NZ$5.00; others US$4.00 or equivalent. Applications to Christchurch Amateur Radio Club Awards Manager, PO Box 1733, Christchurch Mail Centre, Christchurch 8140.

Christchurch Amateur Radio Club Branch 05 Brasspounders' Club Award

The aim of this award is to promote Morse technique in a friendly competitive way and to encourage conversational CW between fellow amateur radio enthusiasts.

A Certificate of Accomplishment will be issued by the Christchurch Branch Awards Manager when suitable evidence shows that the applicant has gained the appropriate points total.

For the "INITIAL AWARD" (25 points minimum) the following QSO types are acceptable.

1. CW QSO with Christchurch Amateur Radio Club Branch 05 Club member — one point.
2. CW QSO with Christchurch Amateur Radio Club Branch 05 "Brasspounders" Club member — two points
3. CW QSO with Christchurch Amateur Radio Club Branch 05 "Brasspounders" Club member via ZL3AC Club Station—four points

   Bonus points may be added to each of the above according to the following criteria:
4. If the QSO was conducted throughout using a STRAIGHT key, claim two bonus points.
5. If the QSO was conducted throughout using an a ELECTRONIC keyer or SEMIAUTOMATIC key (bug type) claim one bonus point.

A QSO conducted with COMPUTER Morse will not be eligible for a bonus.

Type "3" QSOs if multiple, must be spaced at least 24 hours.

Award Par Excellente

60 points minimum

For "AWARD PAR EXCELLENTE", New Zealand "Home Stations" must include at least two type "1" QSOs, and there is no points limit on type "5" contacts. Where the same station is being claimed more than once, there must be at least 24 hours separation between the QSOs.

Overseas stations need only one type "1" QSO for their "Award Par Excellente" included with their claim, and may claim two points for each "ZL" QSO together with one extra bonus point if the "ZL" is a "Branch 05 member". At least 24 hours must separate QSOs where the same station is being claimed more than once.

Rules

Frequencies: All Amateur Band CW frequencies may be used.

Who: All Radio Amateurs.

Claims: Log extracts showing date, time on/time off, signal reports, other operator's call and QTH.

Check: Log extracts shall be countersigned by one other similarly licenced amateur operator.

Duration: Contacts claimed shall have been of at least one quarter hour (15 minute) duration.

Signals: No claims will be accepted with reports of T7 or lower.

When: Only QSOs commenced after the inauguration are acceptable. Inauguration date is 1 February, 1993. There is no closing date for claims unless the award termination is promulgated.

Points: Points claimed for "INITIAL AWARD" may not be used for the "AWARD PAR EXCELLENTE".

Costs: NZ$12.00 Initial Award.

The Club Station ZL3AC will be on the air from 0800 UTC on an occasional basis. The operating frequencies are from 3.5 MHz to 3.575 MHz and on other HF bands depending on conditions.

Address all claims to Christchurch Amateur Radio Club Awards Manager, PO Box 1733, Christchurch Mail Centre, Christchurch 8140, New Zealand.

City of Dunedin Award

Otago Branch 30 promotes this award which features colour photographs of Albatrosses in the colony on the Otago Peninsula, the lighthouse at Tairoa Heads, and a view of Dunedin City from Stuart Street.

Contacts since 1 July, 1986 eligible and the required 10 points for ZL applications (five point DX) may be accumulated from the following allocations:

ZL4AA Branch station	3 pts
Branch 30 President	2 pts
Branch Life Member	2 pts
Branch YL	2 pts
Other Branch members	1 pt

Award is open to SWLs.

NO repeater contacts and each station can be worked ONCE only. Any one band/mode or a combination of any bands/modes may be used. Cost — NZ$2.50 with application to Awards Manager, PO Box 5485, Moray Place, Dunedin 9058.

Fiordland National Park Award

Requirements: Contact four separate stations/operators in or within one kilometre of the Fiordland National Park, plus two contacts with Branch 08 members. Total — six contacts. Send log (no certifying required) with $5.00 (stamps OK) to George McKenzie ZL4JP, Waiparu, No. 7 RD, Gore 9777.

Gisborne Award

Requirements: Contacts after 1 January 1969, as follows: Gisborne amateurs — five different stations. ZL — four stations. Rest of world — two stations.

Cost: ZL/VK/US$5.00. Apply to Ric Coleman, 12 Grundy Street, Mangapapa, Gisborne 4010.

FISTS Down Under Award

The FISTS Down Under Award is earned by accumulating 50 points. For this award contacts with any FISTS Down Under (FDU) member in ZL or VK since the inauguration of FISTS Down Under on 1 June 1988 are worth one point. Contacts with FDU affiliated club stations are worth five points each. (Currently ZL6FF, VK2FDU, ZL2SWR and VK4RC/VK4IZ.) This award is available

for all FISTS Club members worldwide. A station can only be claimed once. – Note, the one point for working a FDU station is the same for all members, (i.e. there is no premium for working outside one's country.)
Please note the special e-mail address for applications for this award, zl2aoh@ihug.co.nz or by post to Ralph Sutton ZL2AOH at call book address. Internet: http://fistsdownunder.org

Kapiti Branch Award

1. Ten points required on any band — including VHF-UHF and repeater contacts. Different stations are required.
2. One point for any NZART member residing permanently in the district.
3. Two points for any branch member.
4. Three points for any committee member.
5. Four points for ZL2KB.
6. Net contacts are permitted, except the Branch net.
7. A listeners' award is available. Recording of sufficient two-way contacts worth 10 points.
8. Packet contacts attract two points each for Kapiti Branch member worked direct.
9. Double points for CW contacts, excluding Field Days.
10. No two contacts with the same station are permitted.
11. Price $5.00 per certificate.
12. Enquiries to Award Manager, Kapiti Amateur Radio Club, C/- P O Box 81, Paraparaumu 5254.

Kawerau Woodskills Festival Award

This is to run the first two weeks in September each year. Contacts with Kawerau Branch 67 stations on any band, ie, HF, VHF, UHF.
Rules
Ten points required for ZL applicants (five points for DX stations) may be accumulated as follows:

1. ZL1KW worth five points, Branch President worth three points, Vice President worth three points, any other Branch member one point.
2. Award is available to all Amateur operators or SWLs who accumulate 10 points.
3. The Award application containing a copy of log details or SWLs, name and address plus $5.00 fee to be received by The Awards Manager no later than November 1 each year.

Applications for this Award to the Awards Manager, Branch 67 NZART, C/- Bev Osborne ZL1OS, 34 Cobham Drive, Kawerau 3127, New Zealand.

Manawatu Award

For overseas stations working FIVE stations who are members of Manawatu Branch 20. Certified list and US$3.00 or five IRCs to ZL2AFT, 429 Albert Street, Palmerston North 4410.

Manawatu Amateur Radio Society Windmill Award

The Manawatu Amateur Radio Society Windmill Award is open to all Amateurs and SWLs. To obtain the award stations require seven contacts with Branch 20 members of which one must be a compulsory contact with the Branch Station ZL2KO.
Stations may only be contacted once and must be financial members of Branch 20 at time of contact. All contacts to be made after 1 September 2000.
Overseas stations only need to contact five branch members and the club station is not a compulsory contact for them but optional.
The award is open to all amateurs and SWLers. The cost of the award is NZ$6.00. Overseas US$5.00 for overseas stations. Please note that this is a separate award to the branch DX award although it is open to DXers.
Applications should be made to: Award Custodian, Manawatu Amateur Radio Society, PO Box 1718, Palmerston North Central, Palmerston North 4440.

Papakura Radio Club "21" Award

For contacts with ZL1VK (5 points) and 8 members (2 points each of the Papakura Radio Club, total of 21 points. These revised rules apply to contacts made after 1 January 2011. Certified list and $5.00 to Secretary, Papakura Radio Club, PO Box 72-397, Papakura, Manukau 2244.

Reefton-Buller Award

Basic Award requires contact with any five Branch 62 members.
Merit Award requires, in addition to Basic, that ZLs contact one Branch 62 XYL or YL and the Club station ZL3BRC. Overseas stations contact any one of those mentioned above. Two categories HF and VHF.
NO QSLs required. Send certified list with $5.00 to NZART Awards' Manager. List of members etc available from Branch 62 Secretary.

The Rhododendron Festival Award

The award is to beld by the combined clubs of Taranaki branches on or about November each year to coincide with "The Rhododendron Festival". The award certificate will be one of a series of coloured, hand-painted prints of named Rhododendron varieties by the well-known Taranaki artist, Janet Marshall. Other designs are provided if requested.
Rules

1. The Award will run for two weeks about the beginning of November each year. It is available to all Amateurs and Shortwave Listeners.
2. Contacts may be made on any band, any mode. Each station may be worked once only for each separate application for the Award.
3. New Zealand stations require 25 points from those listed below:
   Compulsory contact with Special Event Station ZL6RFA — five points
   Contact with Taranaki Branch stations — three points.
   New Plymouth Branch 27 — ZL2AB.
   Hawera Branch 14 — ZL2HAW.
   Inglewood Branch — ZL2PT.
   Rahotu Coastal Branch 32 — ZL2ANN.
   Waitara Branch 47 — ZL2TO.
   South Taranaki Branch 87 — ZL2QF.
   Each additional Taranaki station (ie, a station whose usual base station is in Taranaki) — one point
4. Overseas stations require only six points, calculated as above, and do not have to make a compulsory contact.
5. Copy of log, with a note of your Award choice and fee, to arrive before 10 December to:
   The Award Custodian, NZART Branch 27, C/- 45 Robe Street, New Plymouth 4310, New Zealand
6. Fees, including return postage:
   For ZL award applications $5.00 each.
   For all overseas award applications, US$5.00 or fair equivalent.
   Main operating frequencies Rhodo Net—3.660 ± MHz, NZ Awards Net—3.677 MHz, and any amateur frequencies.

Rag Chewers Award

The award is for a non-stop half hour QSO with any station, on any band, or any mode.
This award was first introduced into New Zealand in 1931 by Alex Rennie ZL2AR.
The certificate is the artist's impression of a "Rag Chewer" and sketched by the well-known cartoonist Jim Hubbard and is professionally printed on gloss paper.
A fee of $5.00 is applicable.
Application for the award can be made to: Ivan Horn ZL2ATU, P.O. Box 7250, Wanganui 4501.

Southern Polar Plunge Award

This Award sponsored by the Otago Branch NZART Inc, coincides with the longest nights/shortest days of the year and is to highlight the mid-winter activities in the southern parts of New Zealand.

1. The Award will run in the week of 21 June and contacts with Otago Branch operators on any band or mode are eligible but each station may be worked once only.
2. Ten points required for ZL applications (five points for DX stations) may be accumulated from the following allocations:
   ZL4AA — Otago Branch Station, three points.
   Branch President, two points.
   Any other Otago Branch member, one point.
3. Award is available to any amateur operators for SWLs who accumulate the necessary points.
4. The Award application containing a copy of log details and operator's or SWL's name and address plus $5.00 fee to be received by — The Awards Manager, Otago Branch NZART Inc, PO Box 5485, Moray Place, Dunedin 9058.

No later than July 31 each year.

The Tane Mahuta Award

By Branch 28 with VHF and HF
Rules

1. The HF Tane Mahuta Award for 20 contacts including at least one in the each of the Counties of Rodney, Otamatea, Hobson, Hokianga, Mangonui, Whangaroa, Bay of Islands, and Whangarei with the rules of NZC Award applying.
2. The VHF Tane Mahuta Award for 20 contacts including at least one in each of the Locator Squares RF63, RF 64, RF65, RF74 and that part of RF73 north of 36° 30'; that is, with Sub-Squares ending in M to X. Contacts must be made from one square to another.
3. Portable and Mobile operation is permitted.
4. Multiple contacts are permitted provided the station contacted is located in a different County or Locator Square for each contact.
5. Repeater contacts are permitted if they are made through Northland repeaters at 6650, 6750, 6775, 7100, 7150, from outside the Northland area.
6. Contacts on or after January 1, 1985 are eligible.
7. QSL cards are not required.

Send certified list of relevant data. BUT for the VHF Award it is necessary to establish the full QTH Locator of the station worked.

8. Applications to Tane Mahuta Award, PO Box 10-078, Te Mai, Whangarei 0143, with cost as within New Zealand NZ$5.00, Australia A$5.00, others US$5.00.

Trigtop Award

Aim 1: *To contact operators from hilltops around the country.*

Aim 2: *To encourage people to venture up hilltops with amateur radio.*

Brief Description

Log contacts you make with hilltop stations to accumulate contact points. Persons with top three points total per calendar year will receive a first, second or third award for that year. Persons scoring over 500,000 will receive an award.

Rules

- Contact may be made once with a trigtop station per day, per hilltop. If an operator stays at a trigtop overnight you may work him or her the next day. If an operator moves to another trigtop in the same day you may also rework him or her.
- Trigtop stations must be within 50m of a trig station as shown on any NZGD2000 Topo 50 map. These are shown by a solid or hollow triangle. "Spot heights" are not counted for this award.
- Operators may access a trig by any means. The mode of transport however will affect the score.
- An operator at a trigtop may claim the hilltop points for him or herself if he or she makes one QSO with another amateur operator. They may self claim only once.
- Permission must be sought by the landowner to access trigtops on private land. Any reports of illegal trespassing will nullify all contacts made from the trig concerned. DOC land and public land is exempt from this. If you are within 50m of a trig and on public land you may claim the trig, provided you do not need to cross into private land at any time without permission.
- Stations must follow band plan and amateur rules to be eligible for the award.

Scoring

Base points – The altitude above sea level of the trigtop as shown on the 260 series maps.

Multiplier 1 – Mode of access to trigtop. X 2 for walking over 100m vertically or over 500m horizontally to the trigtop X1 for all other modes of transport accessing the site.

Multiplier 2 – Retransmission X 2 for simplex contacts.

X 1 for contacts through repeaters, or other retransmission devices.

Multiplier 3 – Activation a Trig X 3 if you are the station at the trigtop

X 1 if you are the station working the trigtop station

Exchange

A valid contact must exchange the following

- Callsign
- Signal Report
- Trigtop Name if known, or NZMG grid reference if not known.
- Trigtop height for scoring as shown on 260 series maps. Do not rely on GPS readings.
- Multipliers for scoring.

Logs

A sample log is attached. Logs must carry the information exchanged in the QSO, and all scoring information. Logs should be submitted for the annual place getter prize in the month of January for the previous calendar year. Logs submitted to claim the award may be submitted at anytime.

Special Case

If one trigtop is working another trigtop, to claim both their and your own points, make two QSOs. The first for your own trigtop to claim for yourself. The second to claim the points of the trigtop you are working. This should be shown in the log as two QSOs.

Appendix 1 – Grid Reference

Map number and 6-figure grid are acceptable for this. Refer to the 260 series of maps for details on how to supply a 6-figure coordinate. State the map number and 6-figure grid in your log. These are accurate to 100m.

Appendix 2 – Multiplier 1

To claim 100m vertical walking, you must have started your tramp at a height above sea level 100m less than the trig. Thus you must have ascended at least 100m to get to the trig. To claim 500m horizontal, your tramp must have taken you over 500m of ground. This equates to half a square on 260 series maps. Meeting either of the above conditions makes you eligible for multiplier 1.

Enjoy this award

Warren Harris
ZL2AJ
warren@technaserve.com

Wairarapa Regional Award

This Award is sponsored by Branches 06, 46 and 82.

Requirements for Award:

work eight counties, 12 towns, 15 postcodes, three lakes, four hospitals, eight rivers, two aerodromes, two lighthouses and 23 museums/historic places. The Award can be worked in three stages: basic, upgrade and final.

A check sheet for working the Award is available on written request with SASE, from the Awards Manager, PO Box 860, Masterton 5840.

This Award may be worked on all bands and all modes starting from 1 January 1997. The "Basic" award costs $5.00. "Upgrade" and "Final" stickers are free on receipt of check sheet and SASE.

Waitomo Award ZL1IZ

Make 10 points with Branch 55 contacts as follows: VHF Simplex or CW, two points; VHF or UHF Repeater, 1 point; HF Phone, one point; HF CW, two points; VHF or UHF Satellite, two points; Club Station ZL1IZ, two points. Echolink or IRLP with branch members' one point.

Log details and $5.00 to ZL1IZ, I. M. Howitt, 3/49 Hinewai Street, Otorohanga 3900.

More info on www.qrz.com.

ZL1IZ, AL1HJ, ZL4SQ, ZL1SQ-R Club repeaters 147.375, 147.225

Wanganui Award

For contacts since 1 January 1982 with permanent residents in the Wanganui area — one point; with Wanganui-based Mobile stations regardless of location — one point; with ZL2JA — two points. Overseas stations require three points; ZLs require five points. (Repeater contacts acceptable.) QSO details with $5.00 or five IRCs to Award Manager, 1 Caversham Road, Wanganui 4105.

WARO AWARDS

General

Contacts may be any mode, any band with NZWARO members who are financial at the time of the contact. No QSLs required. Send full log details certifying that the contacts have been made to Award Manager, Lynnette McDonald ZL1LL, 25 John Street, Pukekohe 2120, New Zealand, with sufficient postage for return of award.

NZWARO HF Award

ZL and VK stations work 10 WARO members resident in New Zealand, DX stations work five. Endorsement seals available to ZL and VK stations for each additional 10 contacts, DX stations five. Contacts with DX members of WARO qualify for endorsements by endorsement application must contain at least three ZL contacts.

NZWARO VHF/ UHF Award

Stations work 10 WARO members on VHF or UHF (repeaters allowed). Endorsements for each additional five.

NZWARO Century Award

1. Applications to contain full log details of contacts with 100 NZWARO members (DX members included).
2. Contacts may be any mode, any band, and each member claimed must be a financial member of NZWARO at the time of the contact and may be counted once only.

NZWARO Mountain Buttercup Award

1. For contacts with licensed NZWARO members, resident, visiting, mobile, etc, in the 60 towns named in the official list. A WARO member working mobile, portable, etc, may claim the relevant town for her own credit. The same WARO member may be contacted in any number of towns.
2. Basic award is available for list of 15 contacts with endorsement seals for each further 10 contacts up to the full 60 required. Applicants submitting a list of the full 60 valid contacts will receive a special award distinctive from the one gained for the lesser number of contacts.
3. Contacts may be any mode or any band, but each YL worked must be a financial member of NZWARO at the time of the contact and must be within a 25 km radius of the town claimed.

An official list of towns required to be worked is listed below or is available from the Manager on receipt of an SAE.

North Island

1. Auckland
2. Dannevirke
3. Dargaville

4. Eketahuna
5. Featherston
6. Gisborne
7. Hamilton
8. Hawera
9. Helensville
10. Kaikohe
11. Kaitaia
12. Masterton
13. Matamata
14. Morrinsville
15. Napier
16. New Plymouth
17. Opotiki
18. Orewa
19. Otaki
20. Paihia
21. Palmerston North
22. Papakura
23. Putaruru
24. Rotorua
25. Taihape
26. Taumarunui
27. Taupo
28. Tauranga
29. Thames
30. Te Awamutu
31. Te Kuiti
32. Turangi
33. Upper Hutt
34. Waihi
35. Wairoa
36. Wanganui
37. Wellington
38. Wellsford
39. Whakatane
40. Whangarei

South Island

41. Alexandra
42. Ashburton
43. Balclutha
44. Blenheim
45. Christchurch
46. Cromwell
47. Dunedin
48. Gore
49. Greymouth
50. Hokitika
51. Invercargill
52. Kaikoura
53. Motueka
54. Nelson
55. Oamaru
56. Queenstown
57. Reefton
58. Timaru
59. Wanaka
60. Westport

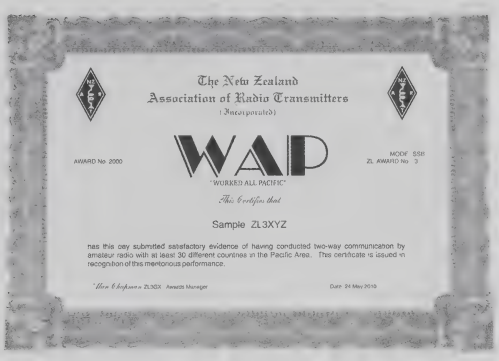
OTC AWARD

Rules for the Award

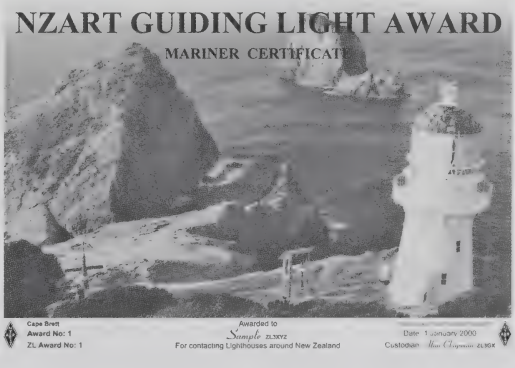
Ten contacts with OTC (ZL) members, each contact worth one point, Phone or CW with an upgrade of 50 points.

The information required on each contact is: call-sign, date, time, name and OTC number. Contacts must be on or after launch date 8 December 1995.

Logs with remittance of $5.00 or IRCs to OTC Award Manager, 25 Annandale Street, New Plymouth 4310. Note that points may not be gained on the OTC National Net on Monday evenings.


The New Zealand
Association of Radio Transmitters
(Incorporated)
WAP
"WORKED ALL PACIFIC"
This Certifies that
Sample ZL3XYZ
has this day submitted satisfactory evidence of having conducted two-way communication by amateur radio with at least 30 different countries in the Pacific Area. This certificate is issued in recognition of this meritorious performance.

NZR
NEW ZEALAND REGIONS AWARD
by NEW ZEALAND ASSOCIATION OF RADIO TRANSMITTERS INC
Awarded to:
Sample
ZL3XYZ
For making two-way contacts with amateur radio stations in all Regions and Districts.



OVERSEAS AWARDS

Note

1. There are hundreds of awards which are publicised in amateur radio periodicals throughout the world each month!
   K1BV Ted Melinosky publishes the KIBV Awards Directory. It is continually updated and can be found at http://www.dxawards.com/
2. Most overseas awards can be certified by NZART Awards Manager so the QSLs don't have to be sent overseas BUT, always send a FULL checking list with all QSO data, etc., on which can be written the certification and which can be sent as the application. (ARRL Awards cannot be certified).
3. ALWAYS SEND SUFFICIENT RETURN POSTAGE for QSLs, etc. Print name and address on each sheet of paper used.

A-1 Operator Club

The basic aim of the A-1 Operator Club is to promote good operating in the amateur bands. To become a member one must be nominated by at least two operators who already belong. Every amateur should strive to merit nomination by following standard operating practice, by observing the rules of good Phone operation, and making his CW as clean and accurate as possible. An attractive certificate is awarded to each amateur who qualifies for membership.
Note: This award is sponsored by the ARRL. Several ZL amateurs are members. Strive to merit nomination — you never know who may be listening. Similar awards are: TOPS; FOC; HSC.

Continents

Issued by IARU only through affiliated Societies. Applications from financial members of NZART only, must be made through the NZART Awards Manager, accompanied by a checking sheet, QSL cards from the six continents, and return stamped envelope. The following eight certificates are available: Basic (mixed mode), CW, Phone, SSTV, RTTY, FAX, Satellite and 5-band. In addition, the following endorsement stickers are available: QRP, 1.8 MHz, 3.5 MHz, 50 MHz, 144 MHz, any higher frequency band and 6-band. Contacts made on 10/18/24 MHz or via satellite are void for the 5-band certificate and 6-band sticker. QRP is defined as five watts OUTPUT (10 W input) and QRP contacts must date on or after January 1 1985. ZL applicants must be NZART members and enclose Break-In label with application. There is NO charge.

RSGB Awards

http://www.rsgb.org/spectrum forum/hf/hfawards/

French Awards

http://www.dxawards.com/DXAwardDir/france-ref.htm
(Applicants for These Awards can be certified by NZART Awards Manager.)

ARRL Awards

WAS — Worked All States
Obtain the rules and application forms for WAS and 5BWAS by sending a business-size SAE and a few IRC to the ARRL Headquarters, 225 Main Street, Newington, CT 06111, USA or from web page http://www.arrl.org/awards/

DXCC—DX Century Club
*See "Countries List" in this Call Book. Many endorsements etc. http://www.arrl.org/awards/
Lee Jennings ZL2AL can check cards for ARRL Awards DXCC, WAS etc.
Contact him on leejen@paradise.net.nz before sending cards.

Australian Awards

Some of the Australian Awards can be found on http://www.wia.org.au/members/awards/about/

NZART AWARDS

Award Notes

When applying for an award, whether through NZART or through an overseas Society, courtesy demands that you observe the following: (1) PRINT your name, address and call-sign; (2) Clearly state what award (and endorsements) you are applying for; (3) Supply checking sheet with call-signs, dates of QSOs, mode, etc.; (4) Enclose required funds (currency/IRC/stamps) as requested.

For NZART Awards

1. The usually accepted rules apply to all NZART awards.
2. NZART stresses the HONOUR SYSTEM. Awards applicants need NOT hold QSL cards for claimed contacts. It is sufficient to merely certify that the QSO was legitimately made. This no QSL rule applies ONLY to NZART sponsored awards.
3. Endorsements for mode/time/location etc., made at applicant's request.
4. New Zealand, US or Australian currency accepted instead of IRC but cheques NOT desirable. New Zealand stamps OK $1, $2 or $3 preferred.
5. Post applications to NZART Awards Manager, PO BOX 1733, Christchurch Mail Centre, Christchurch 8140, New Zealand.

APPLICATION FORMS suitable for most awards are available from NZART Awards Manager (SASE Please) or on the web at www.nzart.org.nz/awards/index.html
COST OF AWARDS. NB — Cost given for awards are those for ZL applicants. Overseas applicants pay US$5.00 for each NZART award or one IRC per $1.00.

For Branch Awards
Logs need not be verified unless stated.
All awards are open to shortwave listeners unless stated.
The honour system also applies to Branch awards.

CJC Captain James Cook Award

To perpetuate the memory of this world famous navigator and seaman—in three classes: Basic "Sailor Class" requires contacts with—G in Yorkshire; FO; ZL2; VK2; KH6 ... For "Officers Class"—"Sailor Class" contacts as well as ZL1, ZL3, ZL4, VK3, VK4, New Guinea, and any Antarctic station ... For "Command Class", as for "Officer Class" as well as any five of the following—VE2, VO, A35, YJ8, FK8, CE8, KL7.
Certified list (confirmations not required) with $3.00, overseas US$5.00, to NZART Awards Manager.

ENZART

A prestige award to honour NZART

1. In three parts — (A) Basic award requires 200 points with endorsements for 250, 300, 350 points. (B) Honour award requires 400 points with endorsements for each additional 50 points. (C) HONOUR PLAQUE for 500 points.
2. Points earned as follows by contacting an NZART member who is on the voting roll of the Branch concerned—Phone QSO, 1; CW QSO, 2; Club Station QSO, 2; YL op. QSO, 1; UHF, VHF QSO, 1; Mobile QSO, 1; AMSAT QSO, 1; Branch President QSO, 1.
3. It is essential to clearly determine that the operator contacted is a financial member of NZART and on the voting roll of the Branch concerned.
4. Contacts claimed with a Branch Station must be from a Clubroom or other permanent headquarters, or alternatively when the station is being operated in a contest, from an exhibition, or other activity of a similar kind. Contacts as a result of call-sign "swapping" at a member's QTH are not eligible.
5. Contacts with mobiles are eligible only when the mobile station is within 50 km of his Branch's Clubrooms or his own QTH. (Note rule 3 above.)
6. One station may be claimed in several categories — e.g. the Branch President can be claimed for both Phone and for CW as well as for Branch President — but EACH claimed must be for a separate contact, and the contacts must be not less than 24 hours apart.
7. Contacts must be "Phone to Phone" or "CW to CW".
8. "Club Net" contacts are not eligible until the net concludes, while contacts made in an organized "awards net" with MC etc., are not eligible.
9. Permanent changes of QTH by claimant are permitted and likewise contacts made during genuine temporary operation.
10. ZL applicants must be members of NZART and all applicants must certify that each contact made fulfils award requirements. No QSL card need be held or submitted but applications must be made on special Check List—cost 10 cents plus SASE (large). Contacts must date 1 November 1976 or later.

11. Each certificate costs $3.00, overseas US$5.00. Endorsements free but SASE required. Overseas US$1.00 Honour Plaque NZ$10.00, overseas US$12.00.
12. Applications to NZART Awards Manager.

IARU Region III Operating Awards

To publicise Region III

1. The award is available to licensed amateurs and SWLs.
2. Contacts made after April 5 1982 are eligible.
3. QSL cards NOT required. Send certified list of eligible contacts from Log Book. Include country in log.
4. Cost is $3.00, overseas US$4.00.
5. Eligible countries are those in Region III whose amateur societies are members of IARU Region III Association. These are: Australia, Bangladesh, Brunei, China (PRC), Chinese Taipei (Taiwan), Fiji, French Polynesia, Hong Kong, India, Indonesia, Japan, Korea, Macau, Malaysia, New Caledonia, New Zealand, Pakistan, Papua New Guinea, Philippines, Pitcairn Island (VR6), Samoa, Singapore, Solomon Islands, Sri Lanka, Taiwan, Thailand, Tonga, Vanuatu, Vietnam. (One contact per country.)
6. PLUS: ONE or more Country credit from US Territories in the Pacific from Guam, Northern Marianas, American Samoa, Wake Island, Baker Howland Group, as presented by ARRL. Chagos Archipelago (VQ9), represented by RSGB. Current total of available "countries" is 34. Requirements for Award as from January 1 1986: Basic, seven areas; Silver Endorsement, 15 areas; Gold Endorsement, 20 areas. These to be reviewed as considered necessary by the custodian who would recommend appropriately to the Secretariat.
7. Awards may be endorsed for any mode or band.
8. Applications to NZART Awards Manager.

NZART Guiding Light Award

This award requires contacts with stations within 30 km of the more remote lighthouses and 10 km of the lighthouses near cities. Depending on the degree of difficulty each lighthouse has been allocated one to five points. A total of 20 points are required for the basic "Mariners" Award and 50 points for the "Master Mariners" Award.

The lighthouses

North Island	***Points***	***km***
Cape Reinga	2	30
Cape Brett	1	30
Mokohinau	5	30
Cuvier Island	3	30
Tiritiri Matangi	1	10
Bean Rock	1	10
East Cape	2	30
Portland Island	2	30
Castlepoint	2	30
Cape Palliser	2	30
Baring Head	1	10
Pencarrow	1	10
Somes Island	1	10
Cape Egmont	1	30
South Island		
Cape Foulwind	1	30
Kahurangi Point	3	30
Farewell Spit	2	30
Boulder Bank	1	10
Stephens Island	5	30
The Brothers	2	30
Cape Campbell	1	30
Godley Head	1	10
Akaroa	1	30
Moeraki	1	30
Taiaroa Heads	1	10
Cape Saunders	1	10
Nugget Point	2	30
Waipapa Point	2	30
Dog Island	1	30
Centre Island	1	30
Puysegur Point	5	30

Full log sheets available from Awards Manager. Eligible contacts for this award must be dated November 1 1998 or later. Cost of both awards $5.00, overseas US$5.00 or five IRC. Applications to NZART Awards Manager.

DOCLands Award

Purpose of Award

To promote the use of Amateur Radio within DOC Controlled Areas. To advertise Amateur Radio from these locations to the public. *(see table below)*

Date of Award

For contacts on or after 1 January 2003

Rules

A station can only be used for one point at each location per trip. If a station is operating from Lake Rotoroa in the Nelson Lakes National Park, from the Sabine Hut, that station must state whether it is a National Park, Forestry Hut or Lake Station. The Transmitting station must be located within the boundaries of:

1. Forest Park for Forest Park Credit.
2. National Park for National Park Credit.
3. within 1 km of a lake, within DOC boundaries for Lake credit.
4. Within 10 km of a lighthouse within DOC Boundaries for lighthouse credit, while the station itself must be within the boundaries of DOCLands.
5. Within viewing distance of a DOC Hut within DOC Boundaries for Forest Hut Credit.
6. On an Island controlled by DOC for Island credit. A station can claim itself for working stations from a location.

QSL's not required

Lakes: Lakes as per our Lakeside award, but those on DOCLands only

The log sheet includes the rules and a list of lighthouses on DOCLands is available from the NZART Awards Manager and will be available in PDF format on the awards section of the NZART web site.

MIA

Minor Islands Award

For contacts with minor islands of the New Zealand coast—e.g. Kapiti Island, Portland Island, Great Barrier Island, Little Barrier Island, Waiheke Island, D'Urville Island, Rangitoto Island, Kawau Island, Motutapu Island, etc., from which FIVE contacts are required. Certified list with $3.00, overseas US$5.00, to NZART Awards Manager.

1. So-called "islands" which are connected to the mainland by a causeway and rocks are not eligible.
2. The station must be located on the island or within the waters up to one nautical mile offshore, unless prevented by hazardous conditions.
3. Where public access is available, M/M stations must be on a mooring, ie, wharf, jetty, buoy, or anchor, or on arrival or departure from a mooring.

National Parks Award

1. For contacts made with stations operating WITHIN boundaries of a New Zealand National Park.
2. Basic award requires TWO contacts.
3. Usual NZART awards rules apply.
4. Endorsement: for each extra two contacts; for VHF Simplex; for VHF via repeater; for each amateur band; etc.
5. Duplicate Contacts (with SAME station) permitted ...
   * on different amateur bands
   * on different days
   * from different Parks.
6. Eligible contacts to date from 1 January 1988.
7. Applications with $3.00, overseas US$5.00, to NZART Awards Manager.

To work stations operating from:	Basic	Intermediate	Advanced
DOC Campsite	2	4	6
National Park	1	2	3
Forest Park	1	3	5
Lighthouse in DOC Control	1	2	3
Lake in DOC area	1	2	3
Forest Hut	2	4	5
DOC Controlled Land on Islands		1	2

NZ Armed Services Award

This award is presented by the Awards Net to remember all amateur radio operators who have served their country.

This award is open to all amateurs and SWLs.

All contacts made after August 1, 1992 will be eligible for this award.

All Amateur bands and modes may be used.

Repeater contacts accepted.

A station may only be contacted once.

Only one service number may be used.

ZL stations to work 100 contacts. VK stations to work 50 contacts. DX stations to work 30 contacts.

Information required: Log data, Service Number, Service in which served (ie, (A) Army, (AF) Air Force, (N) Navy.

Cost of Award: $3.00, overseas US$5.00.

Custodian: NZART Awards Manager.

Check sheet and rules also available from Awards Manager with SASE.

Provision for Award Update if required.

NZA — New Zealand Award

Available to all radio amateurs other than ZL.

Requirements:

35 contacts with ZL1.
plus 35 contacts with ZL2.
plus 20 contacts with ZL3.
plus 10 contacts with ZL4
plus one contact with ZL "territory" — either from New Zealand, Antarctica, Chatham Islands, Kermadec Islands, or Campbell Island. This one contact may be substituted by 20 ordinary ZL contacts if desired.

This makes a minimum of 101 contacts which should be dated from December 8, 1945. Cost overseas US$5.00.

NZC — New Zealand Counties

Basic award required contacts with 20 different New Zealand Counties. Endorsements for 40, 60, 80, 100 are made with a special

certificate for 112. Map showing counties is depicted elsewhere in this section, while checking sheet is available from NZART Awards Manager.

1. Initial certificate with any or all endorsements to 100 costs $3.00, overseas US$5.00.
2. Separate endorsements to 100, after issue of basic award. Endorsement sticker send SASE overseas $US1.00.
3. Special Certificate for "NZC 112" costs $3.00, overseas US$5.00.
4. Checking sheets which MUST be used and which are returned to applicant for record purposes cost SASE, overseas US$2.00.
5. NZC "224" — the "224" Shield was instituted to recognize very outstanding achievement — that of "double 112" with different stations contacted in the relevant counties for each NZC 112. Current cost is $15.00, overseas US$25.00. Paper version available $5.00 overseas $US5.00.
   Applicants for NZC 224 must first hold TWO NZC 112 Awards. Send BOTH log sheets when applying for 224.
6. The operator on a "County DXpedition" whether Mobile or Fixed Portable may claim that County for his own NZC credit.
7. The original "Counties List" will be maintained irrespective of deletions or additions. The criteria will be the actual area of operation which must be determined by the honour of the operator.

NZLA — New Zealand Lakeside Award

1. For Basic Award, contacts are required with stations operating on the shores of TEN (10) freshwater lakes in New Zealand. Endorsements for each additional ten lakes up to 40; Honour Award for 50 lakes with further endorsement for each additional ten.
2. Stations must be located within ONE kilometre of the water or in a town on the lake shore.
3. Full rules are with the Check Sheets which MUST be used when applying for NZLA.
4. Basic Award costs $3.00, overseas US$5.00. Any endorsements SASE, overseas US$1.00.
5. Check Sheets from NZART Awards Manager to whom all applications must be directed.
6. Eligible contacts must date May 1, 1976 or later. NOTE: Check Sheets are returned to applicant and make up a complete record of lakes credited towards award. Basic work for this award was done for NZART by Mike Groth ZL1AHF.

NZART Century Award

Basic requirements

This award is based on the Maidenhead Locator System. The award is open to all amateurs and SWLs. One hundred different sub-squares are required for the Basic Century Award. (100 sub-squares)

Certificates are available for 500, 1000, 1500, 2000, 3000 & 4000 sub-squares.

Each contact must state the full six digits of the Locator position, eg, RF66HK.

Eligible contacts must date January 1, 2000 or later.

Any operator on a "Century Award DXpedition" whether mobile or portable may claim the sub-square for their own credit.

Note

All contacts must be from the New Zealand mainland or surrounding islands.

Log sheets and maps, which give a broad outline of the Squares are available. The map supplied does not give an accurate position of the squares. Info maps that have latitude and longitude must be used for the position of the Sub-squares. For example, InfoMap series 242-1, 242-2, 242-3, 242-4, or similar.

Google maps http://f6fvy.free.fr/qthLocator/fullScreen.php will show your locator.

Cost Certificates NZ, A, US$5.00 each.

Railways Award

To work amateurs within one kilometre of Railway Stations which are the stopping places for the "Northerner", the "Southerner" and Picton- Christchurch Express. (Auckland to Invercargill). Full rules on the Check sheet.

Application with $3.00 or Check sheet, which contains full rules, is available, send SASE to; NZART Awards Manager.

NZR Regions Award

This award is similar to the NZ Counties Award but relates to the current Regional Districts.

Basic requirements

Initial certificates with four Regions and 18 Districts.

Stickers for 8/36 and 12/54 Regions and Districts.

Special award for all Regions and Districts.

Contacts must date 1 January 2000 or later.

Cost Basic award NZ$5.00.

Endorsement sticker, send a SASE.

Overseas US or A$5.00 or five IRCs. Endorsements $2.00 or one IRC.

All Regions and Districts Award

NZ$5.00, US$5.00 or A$5.00.

Double Region Award $15.00, overseas $25.00.

Paper version available $5.00, overseas $US5.00.

Boundaries

The boundaries are as per InfoMaps 242B-1 to 242B-4 (four maps) and will remain to give a basis of stability.

Applications for the award must be on the log sheets which are available from the NZART Awards Manager. Send SASE or via e-mail (PDF file).

The following is a list of Districts (bold Italic type) and the regions.

North Island Regions

Northland
- Far North
- Whangarei
- Kaipara

Auckland
- Rodney
- North Shore
- Waitakere
- Auckland
- Manukau
- Papakura
- Franklin*

Waikato
- Thames-Coromandel
- Hauraki
- Waikato
- Matamata Piako
- Hamilton
- Waipa
- Otorohanga
- South Waikato
- Waitomo*
- Taupo*

Bay of Plenty
- Western Bay of Plenty
- Tauranga
- Rotorua*
- Kawerau
- Whakatane
- Opotiki

Gisborne
- Gisborne

Hawkes Bay
- Wairoa
- Hastings
- Napier
- Central Hawkes Bay

Taranaki
- New Plymouth
- Stratford
- South Taranaki

Wanganui-Manawatu
- Ruapehu
- Wanganui
- Rangitikei*
- Manawatu
- Palmerston North
- Horowhenua
- Tararua

Wellington
- Masterton
- Carterton
- South Wairarapa
- Kapiti Coast
- Porirua
- Upper Hutt
- Lower Hutt
- Wellington

South Island Regions

Nelson
- Nelson

Marlborough
- Marlborough

Tasman
- Tasman

West Coast
- Buller
- Grey
- Westland

Canterbury
- Kaikoura
- Hurunui
- Selwyn
- Waimakariri
- Christchurch
- Banks Peninsula
- Ashburton
- Mackenzie
- Timaru
- Waimate

Otago
- Waitaki*
- Queenstown-Lakes
- Central Otago
- Dunedin
- Clutha

Southland
- Gore
- Southland
- Invercargill

** Districts cross Regions boundaries.*

Tiki Award

Work five different ZLs each on FIVE different bands dated post-war. Cost $3.00, overseas US$5.00.

ZL1 Award

Basic Award requires contacts with 125 different ZL1 stations dating post-war. Endorsements 175 and 250.

ZL2 Award

Basic Award requires contacts with 100 different ZL2 stations dating post-war. Endorsements for 150 and 200.

ZL3 Award

Basic Award requires contacts with 50 different ZL3 stations dating post-war. Endorsements for 75 and 100.

ZL4 Award

Basic Award requires contact with 25 different ZL4 stations dating post-war. Endorsements for 35 and 50.

Note: cost of ZL1/2/3/4 Certificates is $3.00, overseas US$5.00, each with any endorsements. Further endorsements send a SASE, overseas US$1.00, UNLESS a new certificate is required instead of

"sticker", in which case the cost is as above. On issue, certificates will be endorsed for band/mode as requested and for any yearly period of time (January through December). Such endorsements are of course available to applicants at any time after the initial award has been made. ZL or ZM combination is OK. Applications with list to NZART Awards Manager.

VHFCC — VHF Century Club

One hundred points required from QSOs with ZL stations on the following basis:

- 50 MHz band contacts count 1 point.
- 144 MHz band simplex contacts count 3 points. Repeater contacts 1 point.
- 432 MHz band simplex contacts count 6 points. Repeater contacts 1 point.

(Further bands may be added in the future).

The same station may be claimed once on any one band but may be claimed repeatedly on different bands.

Endorsement stickers available for 200, 300, 400, 500 points. Cost $3.00, overseas US$5.00.

WAD — A VHF Award

Contacts required on any VHF band (or mixture of VHF bands) with ZL1, ZL2, ZL3, ZL4—One contact per Call Area. . (Not out of Call Area callsigns.) Cost–$3.00. Send stamps rather than coins or cheques. Overseas $5.00 A or US.

Endorsements for Satellite QSOs.

Calcification of Call Area. For example, you can't claim ZL1 area if the ZL1 is in the ZL3 call area. You may claim the ZL1 for the ZL3 area if they are in the ZL3 area. Repeater contacts OK.

WAP — "Worked All Pacific"

Contacts required with 30 different "Oceania Countries".

Eligible countries ... Any Oceania country, ie eligible as Oceania for WAC (see DXCC list). Cost $3.00, overseas $US5.00. Please include country on log sheet.

Five Band WAP

Contact any 30 eligible Pacific Countries (as counting for Oceania for WAC), each on FIVE different bands making a total of 150. (6, 7, 8 or 9 bands also available.)

Send list of log extracts (QSLs not required to be held) to Awards Manager ... with $15.00, overseas US$25.00.

AWARD: Wooden Shield surmounted with NZART badge and suitably inscribed.

Paper version available $5.00, overseas $US5.00.

WAZL — "Worked All New Zealand"

Contacts required for 45 different Branches of NZART— EXCEPT FOR OVERSEAS APPLICANTS (for whom only 35 are required). Special endorsement when WAZL completed within 12 month period. NB: Mobiles operating outside their own Branch Area must use the Branch Number of the area in which they are operating (for WAZL credit). Cost $3.00, overseas US$5.00 to NZART Awards Manager.

NZART Branches for WAZL

01 Ashburton
02 Auckland
03 Western Suburbs
04 Cambridge
05 Christchurch
06 Tararua
07 Not issued
08 Eastern Southland
09 Egmont (in recess)
10 Franklin
11 Gisborne
12 Hamilton
13 Hastings/Havelock North
14 Hawera (in recess)
15 Central Hawkes Bay (in recess)
16 Horowhenua
17 Huntly
18 Hutt Valley
19 Inglewood
20 Manawatu
21 Manukau
22 Marlborough
23 Marton and Districts
24 Motueka
25 Napier
26 Nelson
27 New Plymouth
28 Whangarei
29 North Shore
30 Otago
31 Pahiatua (in recess)
32 Rahotu Coastal (absorbed in Br 87)
33 Rotorua
34 South Canterbury
35 South Otago
36 South Westland (in recess)
37 Southland
38 Taumarunui (in recess)
39 Tauranga
40 Te Awamutu
41 Thames
42 Titahi Bay
43 Waihi and Districts
44 Matamata
45 Waimarino (in recess)
46 Wairarapa
47 Waitara
48 Wanganui
49 Westland
50 Wellington
51 Eastern Bay of Plenty
52 Northern Hawkes Bay (in recess)
53 Te Puke
54 Patea (absorbed in Br 87)
55 Waitomo
56 Christchurch West
57 Tokoroa
58 Helensville (in recess)
59 Mangakino (in recess)
60 Taupo
61 Central Otago
62 Reefton-Buller
63 Upper Hutt
64 North Otago
65 Papakura
66 Auckland VHF
67 Kawerau
68 North Canterbury
69 Kapiti
70 Feilding (in recess)
71 Rodney
72 Opotiki
73 Northern Wairoa (in recess)
74 Wellington VHF
75 Queenstown (in recess)
76 Kaikoura
77 Te Aroha (in recess)
78 Far North Districts
79 Howick and Districts (in recess)
80 Hibiscus Coast
81 Waikato
82 Southern Wairarapa
83 Raglan
84 Bay of Islands
85 Mercury Bay
86 Suburban
87 South Taranaki
88 Tauranga Emergency Communications Group

Yearly Award

This award is an annual award starting on 1 January and ending on 31 December each year.

The rules are as follows:

1. A total of 80 contacts required.
2. The numbers of years licensed must be obtained from station worked.
3. The licensed years are totalled to 1000 or more years.
4. Log details must include the operator's call-sign, name, licensed years and date worked.
5. The award is open to all SWLs who must include in addition to the above, both operators names and call-signs.
6. Logs must include at least 20 ZL contacts.
7. Send $3.00, overseas US$5.00, to the NZART Awards Manager.

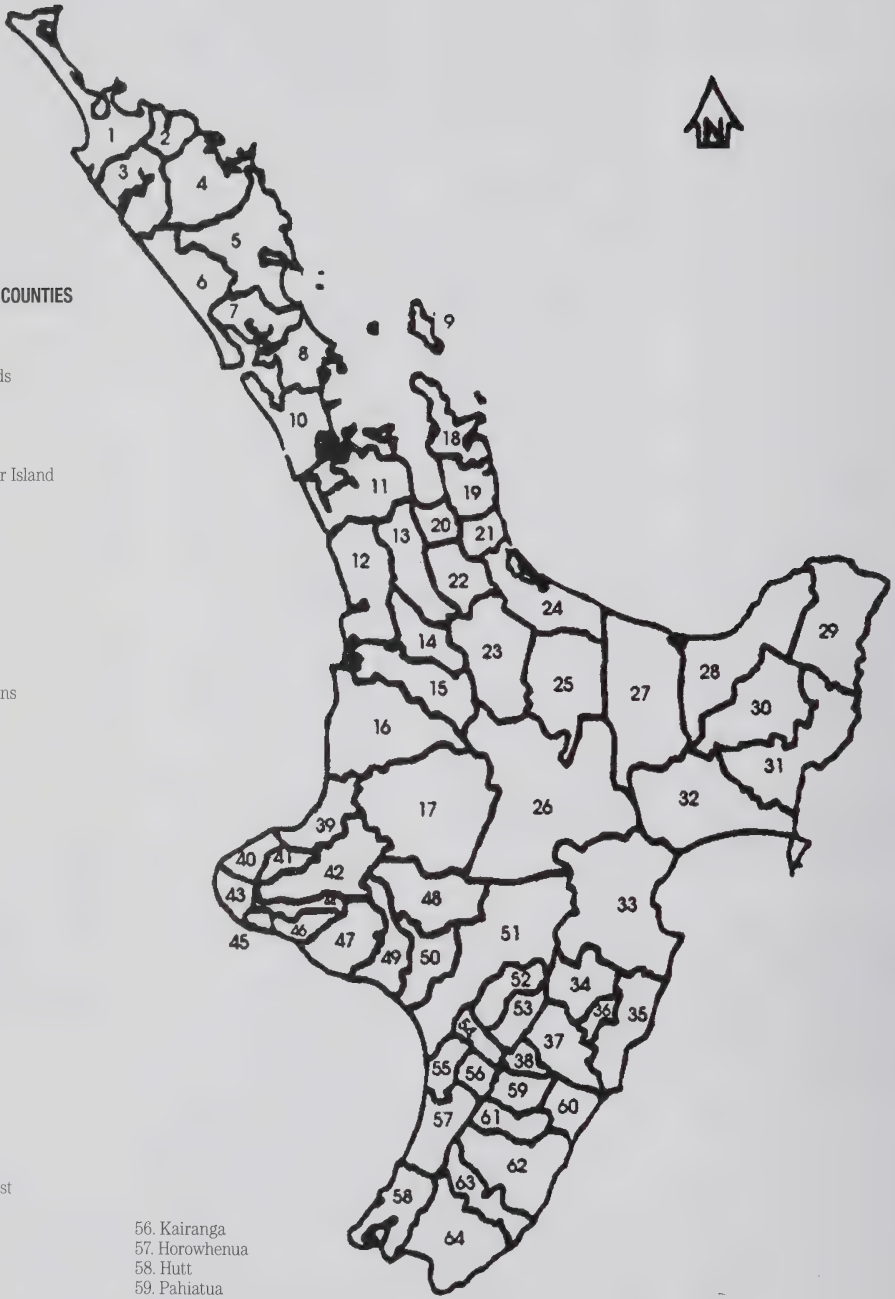
"5 × 5"—Five by Five

This premier award has been instituted to recognize the increasing interest in Five Band DX operation. The initial award requires that the same station be contacted on five bands repeated with five different DXCC countries. First endorsement after a further five has been contacted (total of 10) with the 20 endorsement requiring another ten and so on to 100. Certified list with full QSO data and fee of $3.00, overseas US$5.00, which includes all endorsements. Certificate is outstanding and is overprinted in embossed gold. Contacts must date from 1945.

ZLA Award

Contacts required with Auckland City, Wellington City, Christchurch City, Dunedin City, Antarctica ZL5, Campbell Island, Chatham Island, Kermadec Island. Applicants must send certified list to NZART Awards Manager with $3.00, overseas US$5.00.

NORTH ISLAND COUNTIES



NORTH ISLAND COUNTIES

1. Mangonui
2. Whangaroa
3. Holianga
4. Bay of Islands
5. Whangarei
6. Hobson
7. Otamatea
8. Rodney
9. Great Barrier Island
10. Waitemata
11. Franklin
12. Raglan
13. Waikato
14. Waipa
15. Otorohanga
16. Waitomo
17. Taumarunui
18. Coromandel
19. Thames
20. Hauraki Plains
21. Ohinemuri
22. Piako
23. Matamata
24. Tauranga
25. Rotorua
26. Taupo
27. Whakatane
28. Opotiki
29. Waiapu
30. Waikohu
31. Cook
32. Wairoa
33. Hawke's Bay
34. Waipawa
35. Patangata
36. Waipukurau
37. Dannevirke
38. Woodville
39. Clifton
40. Taranaki
41. Inglewood
42. Stratford
43. Egmont
44. Eltham
45. Waimate West
46. Hawera
47. Patea
48. Waimarino
49. Waitotara
50. Wanganui
51. Rangitikei
52. Kiwitea
53. Pohangina
54. Oroua
55. Manawatu
56. Kairanga
57. Horowhenua
58. Hutt
59. Pahiatua
60. Akitio
61. Eketahuna
62. Masterton
63. Waiarapa South
64. Featherston

SOUTH ISLAND COUNTIES

SOUTH ISLAND COUNTIES

65. Marlborough
66. Awatere
67. Kaikoura
68. Golden Bay
69. Waimea
70. Buller
71. Inangahua
72. Grey
73. Westland
74. Amuri
75. Cheviot
76. Waipara
77. Kowai
78. Ashley
79. Rangiora
80. Eyre
81. Oxford
82. Tawera
83. Malvern
84. Paparua
85. Waimairi
86. Heathcote
87. Halswell
88. Mount Herbert
89. Akaroa
90. Chatham Islands
91. Wairewa
92. Ellesmere
93. Ashburton
94. Geraldine
95. Levels
96. Mackenzie
97. Waimate
98. Waitaki
99. Waihemo
100. Waikouaiti
101. Peninsula
102. Taieri
103. Bruce
104. Clutha
105. Tuapeka
106. Maniototo
107. Vincent
108. Lake
109. Southland
110. Wallace
111. Fiord
112. Stewart Island

FIXED LOCATION STATIONS
Updated as at 27 June 2010

The engineering details in these tables are from the MED's SMART Database ©MED.
Additions and modifications to the engineering details are only possible by making a licence application.
Licence applications via the MED cost $400, whereas licence applications via NZART cost $50.
Licence applications via NZART should be made on NZART Form 10, available on the FMTAG section of the NZART website.

Note on update status:
C in the right-hand column indicates that the station is under construction or is temporarily off-air.
N in the right-hand column indicates that the Branch has not responded, by the cut-off date, to the May 2010 FMTAG information update request.
Note on repeater input/output offsets:
Most repeaters receive LOW and transmit HIGH, except 7025 to 7375 on 2 metres, and the 434.xxx National System repeaters.

6m Repeaters

User transmits 1 MHz lower. Vertical polarisation.

Station Name	Frequency	MED Site Name	Topo50 Map Ref	Branch	Trustee 1	Trustee 2
Alexandra 3625	53.6250	FRUITLANDS	CD13 043 718	61	ZL4THT	ZL4GP
Auckland 3725	53.7250	KLONDYKE ROAD	BC32 602 642	66	ZL1TGC	ZL1BK
Cass Peak 385	53.8500	CASS PEAK	BX24 697 684	CA	ZL2BCF	ZL3TMB

2m Repeaters

User transmits 600 kHz lower for repeater output frequencies of 145.325 to 147.000 MHz. Vertical polarisation.
User transmits 600 kHz higher for repeater output frequencies of 147.025 to 147.375 MHz. Vertical polarisation.

Station Name	Frequency	MED Site Name	Topo50 Map Ref	Branch	Trustee 1	Trustee 2	
Rotorua Linear 435	144.3500	MOERANGI HEIGHTS	BE37 967 778	33	ZL1PJ	ZL1BWC	
Kapiti Voice and Data 535	145.3500	MT FIELD	BP32 775 757	69	ZL2GO	ZL4VV	
Opunake 540	145.4000	KIRI ROAD	BJ29 860 396	87	ZL2QP	ZL2ADU	LINKED
Brynderwyn 560	145.6000	PILBROW HILL	AY30 277 076	28			N
Ward 560	145.6000	WELD CONE	BS29 972 665	22	ZL2BK	ZL2WD	LINKED
Tararua Voice & Data 5625	145.6250	MT BUTTERS	BN36 572 057	O6	ZL2KA	ZL2KG	LINKED
Canterbury 5625	145.6250	CASS PEAK	BX24 697 684	CA	ZL2BCF	ZL3TMB	LINKED
Raglan 5675	145.6750	TE UKU	BD32 733 067	81	ZL1TAT	ZL1THG	
Manawatu 5725	145.7250	PAHIATUA TRACK	BM35 316 240	20	ZL2FX	ZL2WD	
Auckland 5775	145.7750	MUSICK POINT	BA32 695 203	86	ZL1BFB	ZL1TRH	
Invercargill 5775	145.7750	BLUFF HILL	CH10 432 270	37	ZL4OX	ZL4CSS	
Auckland 6625	146.6250	KLONDYKE ROAD	BC32 602 642	66	ZL1TGC	ZL1BK	
Timaru 6625	146.6250	MT HORRIBLE	CA19 460 818	34	ZL3GL	ZL3OZ	
Whangarei 665	146.6500	PARAKIORE	AX30 160 532	28			N
Wharite 665	146.6500	WHARITE	BM35 430 401	O6	ZL2KA	ZL2KG	LINKED
Dunedin 665	146.6500	HIGHCLIFF	CE17 133 163	30	ZL4JH	ZL4GR	
Auckland 670	146.7000	RUAOTUWHENUA	BA31 383 125	66	ZL1TGC	ZL1SLO	
Hawkes Bay 670	146.7000	KAHURANAKI	BK39 316 877	13	ZL2AJ	ZL2DW	
Motueka 670	146.7000	MT CAMPBELL	BP24 876 475	24	ZL2BCG	ZL2ASF	
Oamaru 670	146.7000	STATION PEAK	CB17 073 418	64	ZL4DB	ZL4SN	
Bay of Islands 675	146.7500	MANGINANGINA	AV28 734 034	84	ZL1IU	ZL1RS	
Taupo 675	146.7500	MAROANUI	BF36 634 324	60	ZL1BU	ZL1KU	
Titahi Bay 675	146.7500	ONEPOTO RESERVOIR	BP31 553 476	42	ZL2TKY	ZL2AZ	
Westport 675	146.7500	CAPE FOULWIND	BR20 724 769	62			N
Mount Grey 675	146.7500	MT GREY	BW23 632 256	35	ZL4FZ		
Balclutha 675	146.7500	KURIWAO	CF13 204 730		ZL4TL	ZL4AM	

Akatere 6775	146.7750	AKATERE	AU28 606 261	78			N LINKED
Taihape 6775	146.7750	MATAROA	BK35 344 024	23	ZL2KC	ZL2ADL	
Tauranga 680	146.8000	MINDEN AMATEUR	BD36 692 218	39	ZL1TAJ	ZL1BVA	
Poverty Bay 680	146.8000	KAITI HILL	BG43 378 069	11	ZL2TRG	ZL2HC	
Masterton 680	146.8000	RANGITUMAU	BP35 307 749	46	ZL2BA	ZL4JS	
Murchison 680	146.8000	MT MURCHISON	BR23 583 801	26	ZL2BCA	ZL2RP	
Tekapo 680	146.8000	MT ROLLESBY	BZ17 092 075	34	ZL3GL	ZL3OZ	LINKED
Invercargill 680	146.8000	BALD HILL	CF08 010 743	37	ZL4OX	ZL4CSS	
Arowhana 685	146.8500	AROWHANA	BE43 262 703	11	ZL2TRG	ZL2HC	
Kapiti 685	146.8500	MT FIELD	BP32 775 757	69	ZL2GO	ZL4VV	
Queenstown 685	146.8500	REMARKABLES	CC11 694 014	75	ZL4JW		C LINKED
Auckland 690	146.9000	MT PUKETUTU	BB32 795 816	66	ZL1JD	ZL1UET	
Gisborne 690	146.9000	WHAKAPUNAKE	BH42 992 917	11	ZL2TRG	ZL2HC	
Wanganui 690	146.9000	WANGANUI	BK32 755 884	48			N
Kaikoura 690	146.9000	KAIKOURA	BT27 573 033	22	ZL2BK	ZL2WD	
Dunedin 690	146.9000	MT CARGILL	CE17 101 239	30	ZL4JH	ZL4GR	
Waikato 695	146.9500	MT TE AROHA	BC35 422 422	81	ZL1TAT	ZL1THG	
Blenheim 695	146.9500	THE NED	BR28 767 893	22	ZL2BK	ZL2WD	LINKED
Greymouth 695	146.9500	SEWELL PEAK	BT19 636 036	49	ZL3ADH	ZL3TY	
Waitaki 695	146.9500	MT STUDHOLME	CA18 353 531	34	ZL3GL	ZL3OZ	
Gore 695	146.9500	MCLEODS HILL	CF12 800 932	O8	ZL4TCS	ZL4GL	
Tairua 6975	146.9750	TAIRUA	BB35 505 046	85	ZL1AAF	ZL1BCJ	
North Canterbury 6975	146.9750	MT NOBLE	BV23 502 536	68	ZL3AI	ZL4WX	
Edgecumbe 700	147.0000	PUTAUAKI	BE39 275 759	67	ZL1CAY	ZL1OW	
Lower Hutt 700	147.0000	MT FITZHERBERT	BQ32 644 351	18	ZL2TVM	ZL2TWS	
Alexandra 700	147.0000	FRUITLANDS	CD13 043 718	61	ZL4THT	ZL4GP	
Nelson 7025	147.0250	GRAMPIANS	BQ26 234 283	26	ZL2BCA	ZL2RP	
Egmont 705	147.0500	MT EGMONT	BJ29 952 487	87	ZL2AFE	ZL2UFN	LINKED
Christchurch 705	147.0500	MARLEYS HILL	BX24 704 714	O5			N
Mercury Bay 7075	147.0750	KAKATARAHAE	BA34 280 138	85	ZL1AAF	ZL1BCJ	
Colonial Knob Voice & Data 7075	147.0750	COLONIAL KNOB	BP31 513 426	74	ZL3TC	ZL4JY	
Far North 710	147.1000	MAUNGATAUREIA	AV27 432 083	78			LINKED
Belmont 710	147.1000	MT BELMONT	BQ32 569 399	74	ZL3TC	ZL2TVM	
Manawatu 7125	147.1250	PAHIATUA TRACK	BM35 316 240	20	ZL2FX	ZL2WD	
Taumarunui 715	147.1500	MT HIKURANGI	BG33 998 037	38	ZL1UTH	ZL1TIG	
Southern Wairarapa 715	147.1500	THE KNOLL	BQ33 026 387	82	ZL2BLM	ZL2SJ	
Westport 715	147.1500	MT FREDERICK	BR21 040 823	62			N
Te Puke 7175	147.1750	SHAW ROAD	BE37 870 015	53	ZL1MOF	ZL1TAJ	
Pariwhariki 7175	147.1750	PARIWHARIKI TRIG	BP35 289 460	46	ZL2BA	ZL4JS	
New Plymouth 720	147.2000	ROBE STREET	BH29 928 758	27	ZL2BR	ZL2BZH	
Nelson 720	147.2000	SADDLE HILL	BQ27 362 306	26	ZL2BCA	ZL2RP	
Doubtless Bay 7225	147.2250	RANGIAWHIA	AU26 357 416	78			N LINKED
Hairini 7225	147.2250	PUAHUE ROAD	BE34 075 892	55	ZL4SQ	ZL1HJ	
Picton 7225	147.2250	MT FREETH	BQ28 824 286	22	ZL2BK	ZL2WD	LINKED
Whangarei 725	147.2500	HOROKAKA	AX29 025 299	28			N

Napier 725	147.2500	TARAPONUI	BH38 233 618	25	ZL2TC	ZL2DW	
Canterbury 725	147.2500	HERBERT PEAK	BX24 792 627	O5			N
Kakaramea 7275	147.2750	KAKARAMEA	BH35 336 825	38	ZL1UTH	ZL1TIG	
Rodney 730	147.3000	SCHOLLUM ACCESS	AZ31 490 616	71			N
Whakatane 730	147.3000	WHAKATANE	BE40 528 888	51	ZL1NI	ZL1BCW	
Climie 730	147.3000	MT CLIMIE	BP33 801 431	63	ZL2HM	ZL2BRG	
Ponga 7325	147.3250	PONGA HILL	BB32 782 912	86	ZL1BFB	ZL1TRH	
Barton 7325	147.3250	MT BARTON	BR33 952 969	46	ZL2BA	ZL4JS	
Rotorua 735	147.3500	MOERANGI	BE37 903 691	33	ZL1PJ	ZL1BWC	
Rewa 735	147.3500	REWA	BP35 507 506	46	ZL2BA	ZL4JS	
Waitomo 7375	147.3750	RANGITOTO	BF34 110 510	55	ZL4SQ	ZL1HJ	
Golden Bay 7375	147.3750	TAKAKA HILL	BP25 883 586	24	ZL2BCG	ZL2VBO	LINKED

23cm REPEATERS

User transmits 20 MHz lower (except Mt. Victoria). Vertical polarisation.

Station Name	Frequency	MED Site Name	Topo50 Map Ref	Branch	Trustee 1	Trustee 2
Mt Victoria 120	1271.2000	MT VICTORIA	BQ31 504 269	74	ZL3TC	ZL4JY
Auckland 190	1291.9000	GLENFIELD ROAD	BA31 538 263	66	ZL1TGC	ZL1JD

70cm REPEATERS

User transmits 5 MHz lower for 438.xxx and 439.xxx. Vertical polarisation.
User transmits 5 MHz higher for 433.xxx and 434.xxx. Vertical polarisation.
National System repeaters are listed in another table.

Station Name	Frequency	MED Site Name	Topo50 Map Ref	Branch	Trustee 1	Trustee 2	
Hakes Bay 270	432.7000	MT THREAVE	BK39 241 930	13	ZL2AJ	ZL2DW	VOIP SIMPLEX
Wairarapa 3825	433.8250	PARIWHARIKI TRIG	BP35 289 460	46	ZL2BA	ZL4JS	
Mosgiel 820	438.2000	SADDLE HILL RD	CE16 957 129	30	ZL4JH	ZL4GR	SIMPLEX
Ponga 825	438.2500	PONGA HILL	BB32 782 912	86	ZL1BFB	ZL1TRH	
Dunedin 830	438.3000	HIGHCLIFF	CE17 134 163	30	ZL4JH	ZL4GR	SIMPLEX LINKED
Christchurch 840	438.4000	MARLEYS HILL	BX24 705 712	CA	ZL3MJS	ZL3TMB	
Waikato 840	438.4000	TE AROHA	BC35 422 422	81	ZL1TAT	ZL1THG	
Taraponui 8425	438.4250	TARAPONUI	BH38 233 618	25	ZL2TC	ZL2DW	
Lower Hutt 8425	438.4250	BIRCH STREET	BQ32 611 359	18	ZL2TVM	ZL2TWS	
Blenheim 845	438.4500	TUAMARINA	BQ28 784 163	22	ZL2BK	ZL2WD	
Auckland 845	438.4500	KLONDYKE ROAD	BC32 602 642	66	ZL1TGC	ZL1BK	
New Plymouth 8475	438.4750	CARRINGTON ROAD	BH29 873 616	27	ZL2BR	ZL2BZH	C
Cass Peak 850	438.5000	CASS PEAK	BX24 697 684	56	ZL3VI	ZL2BCF	
Manawatu 8525	438.5250	PAHIATUA TRACK	BM35 316 240	20	ZL2FX	ZL2WD	
Te Puke 855	438.5500	SHAW ROAD	BE37 870 015	53	ZL1MOF	ZL1TAJ	
Greymouth 8575	438.5750	SEWELL PEAK	BT19 636 036	49	ZL3ADH	ZL3TY	LINKED
Manurewa 8575	438.5750	MANUREWA	BB32 701 047	86	ZL1UET	ZL1BFB	
Hunua 860	438.6000	GILLESPIE ROAD	BB33 805 921		ZL1BNQ	ZL1AVR	
Climie 860	438.6000	MT CLIMIE	BP33 801 431	63	ZL2HM	ZL2BRG	
Taihape 865	438.6500	CLEAVERS HILL	BK35 356 211	23	ZL2KC	ZL2ADL	
Oamaru 865	438.6500	CAPE WANBROW	CC18 405 023	64	ZL4DB	ZL4SN	
Invercargill 870	438.7000	INVERCARGILL	CG10 434 502	37	ZL4OX	ZL4CSS	

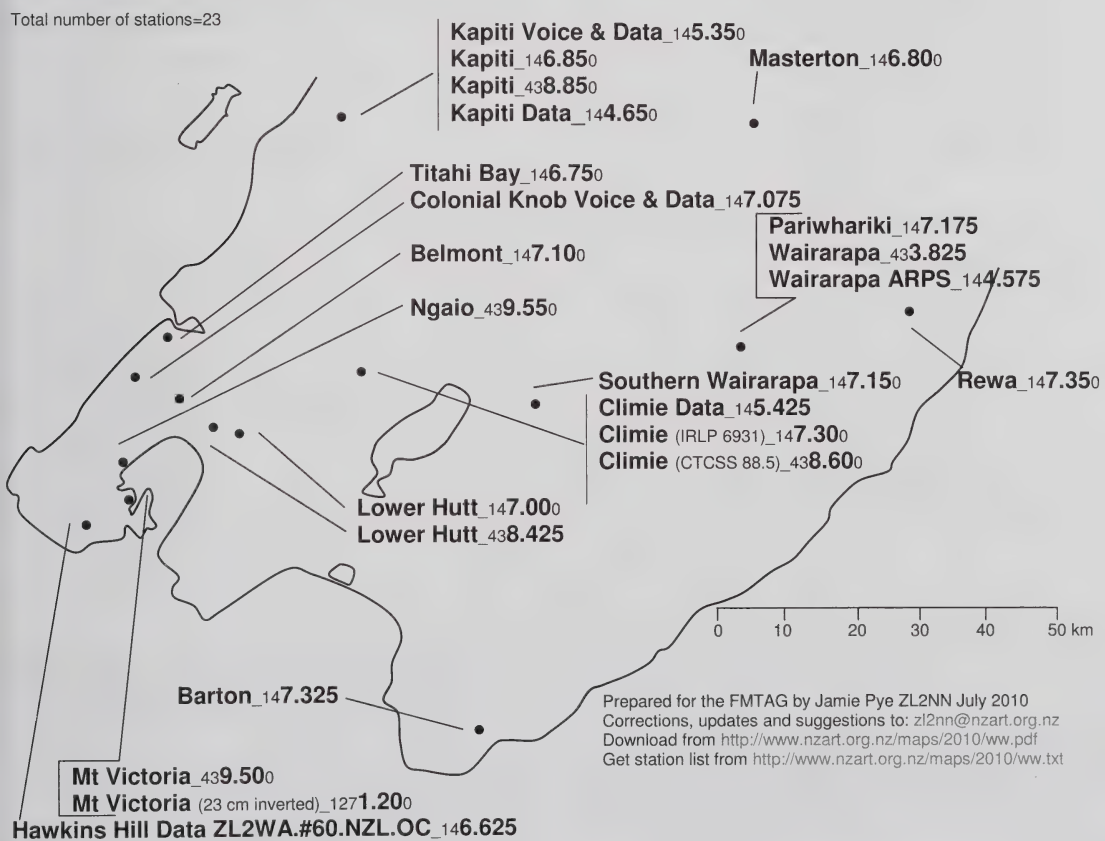
70cm REPEATERS

User transmits 5 MHz lower for 438.xxx and 439.xxx. Vertical polarisation.
User transmits 5 MHz higher for 433.xxx and 434.xxx. Vertical polarisation.
National System repeaters are listed in another table.

Station Name	Frequency	MED Site Name	Topo50 Map Ref	Branch	Trustee 1	Trustee 2	
Whangarei 870	438.7000	PARAHAKI	AX30 211 471	28			N
Hawkes Bay 870	438.7000	TE MATA	BK39 348 987	13	ZL2AJ	ZL2DW	LINKED
Waitomo 870	438.7000	RANGITOTO	BF34 110 510	55	ZL4SQ	ZL1HJ	
Egmont 880	438.8000	MT EGMONT	BJ29 952 487	87	ZL2AFE	ZL2UFN	
Timaru 885	438.8500	MT HORRIBLE	CA19 460 818	34	ZL3GL	ZL3OZ	
Tauranga 885	438.8500	PAPAMOA	BD37 895 185	39	ZL1TAJ	ZL1BVA	
Kapiti 885	438.8500	MT FIELD	BP32 775 757	69	ZL2GO	ZL4VV	
Nelson 890	438.9000	FRINGED HILL	BQ26 266 268	26	ZL2BCA	ZL2RP	
Hawkes Bay 9175	439.1750	CLIFTON TRIG	BK39 440 042	13	ZL2AJ	ZL2DW	
Mt Victoria 950	439.5000	MT VICTORIA	BQ31 504 269	74	ZL3TC	ZL2TVM	
Gisborne 950	439.5000	TE KAPUA	BG43 242 289	11	ZL2TRG	ZL2CC	
Ngaio 955	439.5500	NGAIO RESERVOIR	BQ31 494 316	74	ZL3TC	ZL2SX	
Wharite Voice & Data 960	439.6000	WHARITE	BM35 431 399	O6	ZL2KA	ZL2KG	LINKED

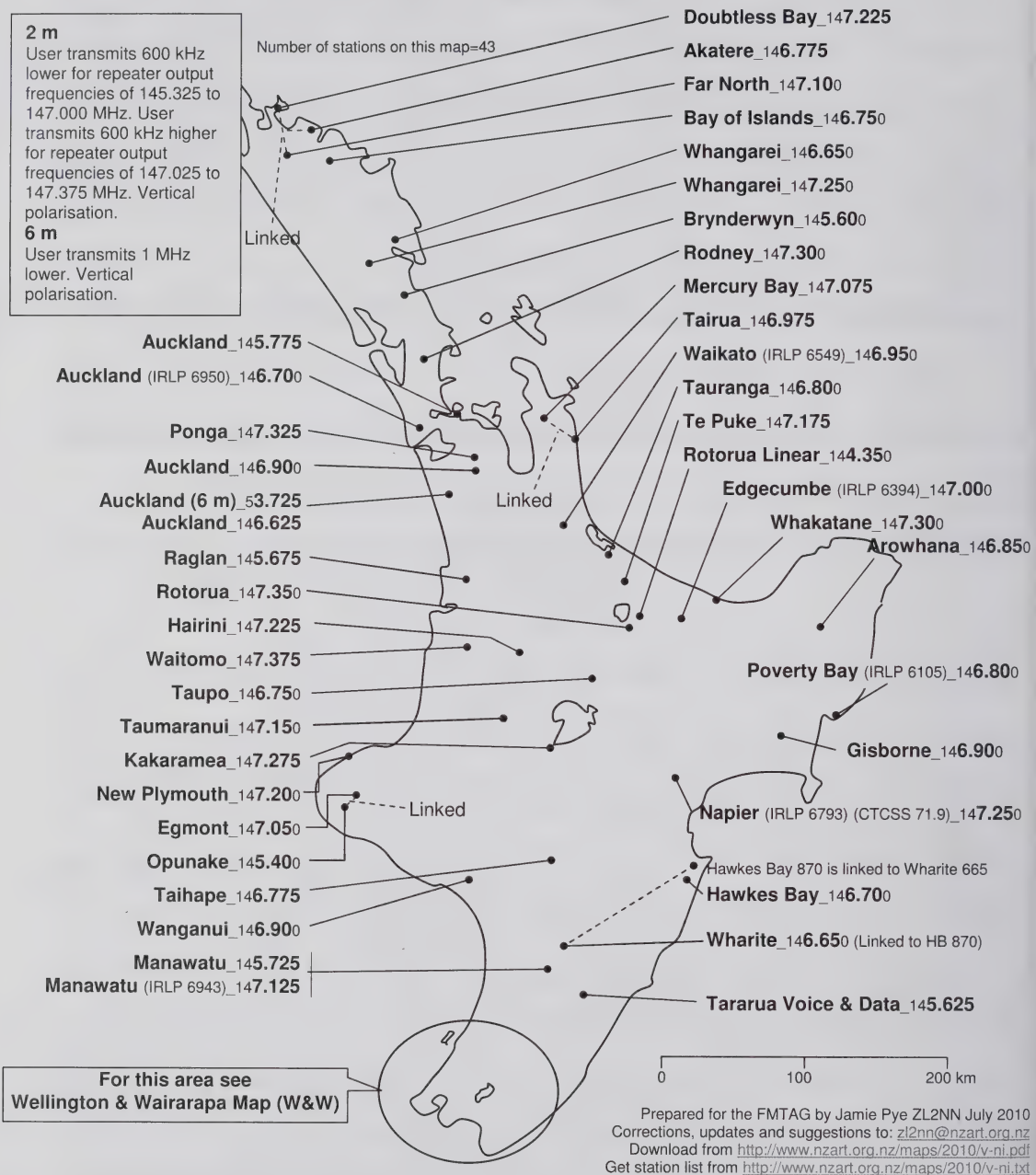
Wellington & Wairarapa Amateur Radio UHF & VHF Repeaters 2010

NOTE 1. The **naming system** is explained on the map **New Zealand Amateur Radio ATV Repeaters 2010.**
2. **Repeater Offsets (splits)** are explained on the map **New Zealand Amateur Radio National System 2010**



North Island Amateur Radio 6 m & 2 m (VHF) Repeaters 2010

NOTE 1. The **naming system** is explained on the map **New Zealand Amateur Radio ATV Repeaters 2010.**
2. **Repeater Offsets (splits)** are explained on the map **New Zealand Amateur Radio National System 2010**



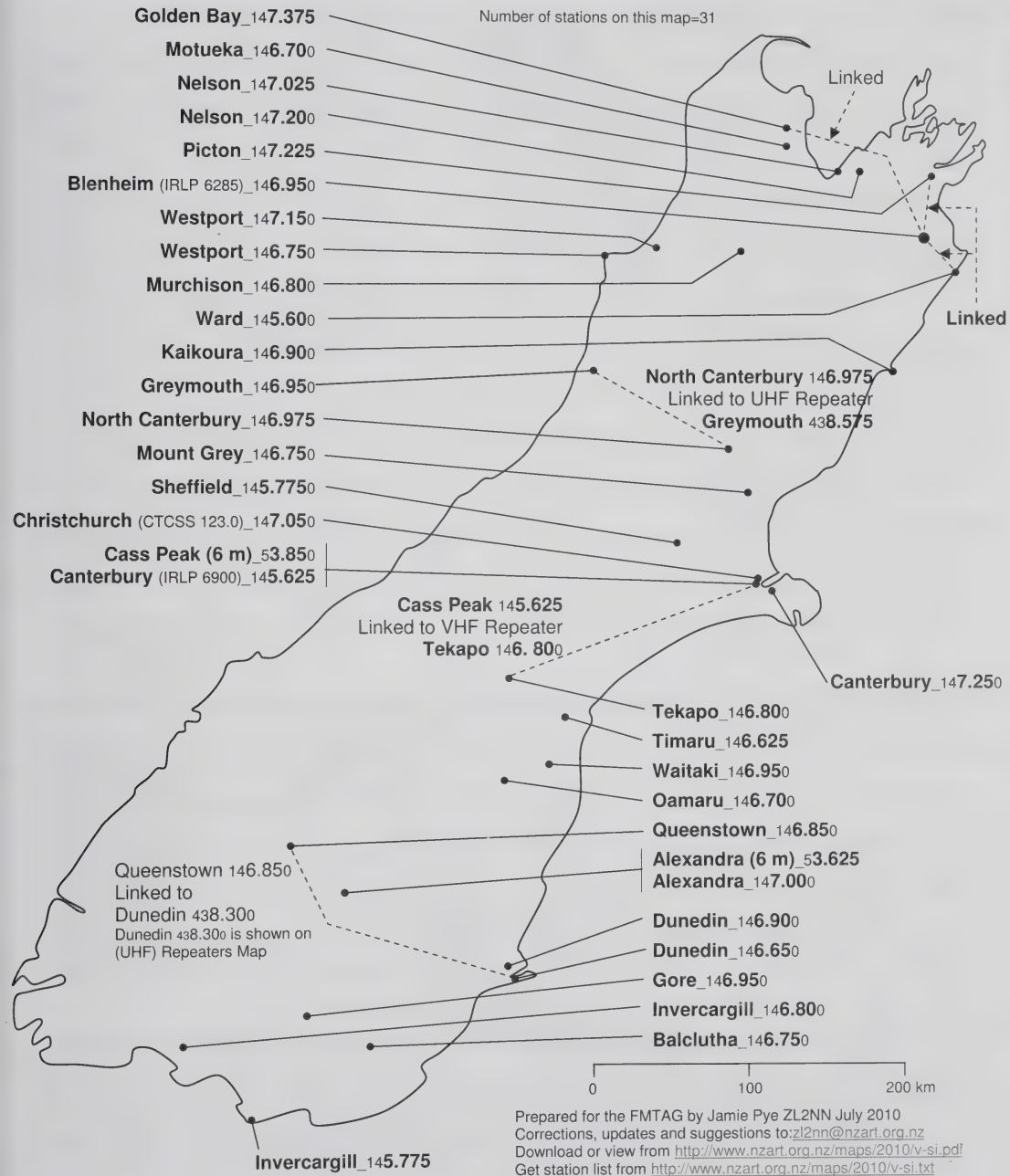
Prepared for the FMTAG by Jamie Pye ZL2NN July 2010
Corrections, updates and suggestions to: zl2nn@nzart.org.nz
Download from http://www.nzart.org.nz/maps/2010/v-ni.pdf
Get station list from http://www.nzart.org.nz/maps/2010/v-ni.txt

INTERNET RADIO LINKING PROJECT (IRLP)I
For information see http://www.irlp.net/ or
http://homepages.xnet.co.nz/~rosvonne/EcholinkWebpage/Echolinkmapn.pdf

South Island Amateur Radio 6 m & 2 m (VHF) Repeaters 2010

IOTE 1. The **naming system** is explained on the map for **New Zealand Amateur Radio ATV Repeaters 2010.**
. **Repeater Offsets (splits)** are explained on the map for **New Zealand Amateur Radio National System 2010.**
. **IRLP** in the **South Island** is on: **Blenheim 695** IRLP 6285 and **Cass Peak 5625** IRLP 6900.
. ZL4DM Dunedin 147.425 IRLP 6184 is not shown on these maps. For further details see http: /www.irlp.net

. **2 m** User transmits 600 kHz lower for repeater output frequencies of 145.325 to 147.000 MHz. User transmits 600 kHz higher for epeater output frequencies of 147.025 to 147.375 MHz. Vertical polarisation. 6. **6 m** User transmits 1 MHz lower. Vertical polarisation



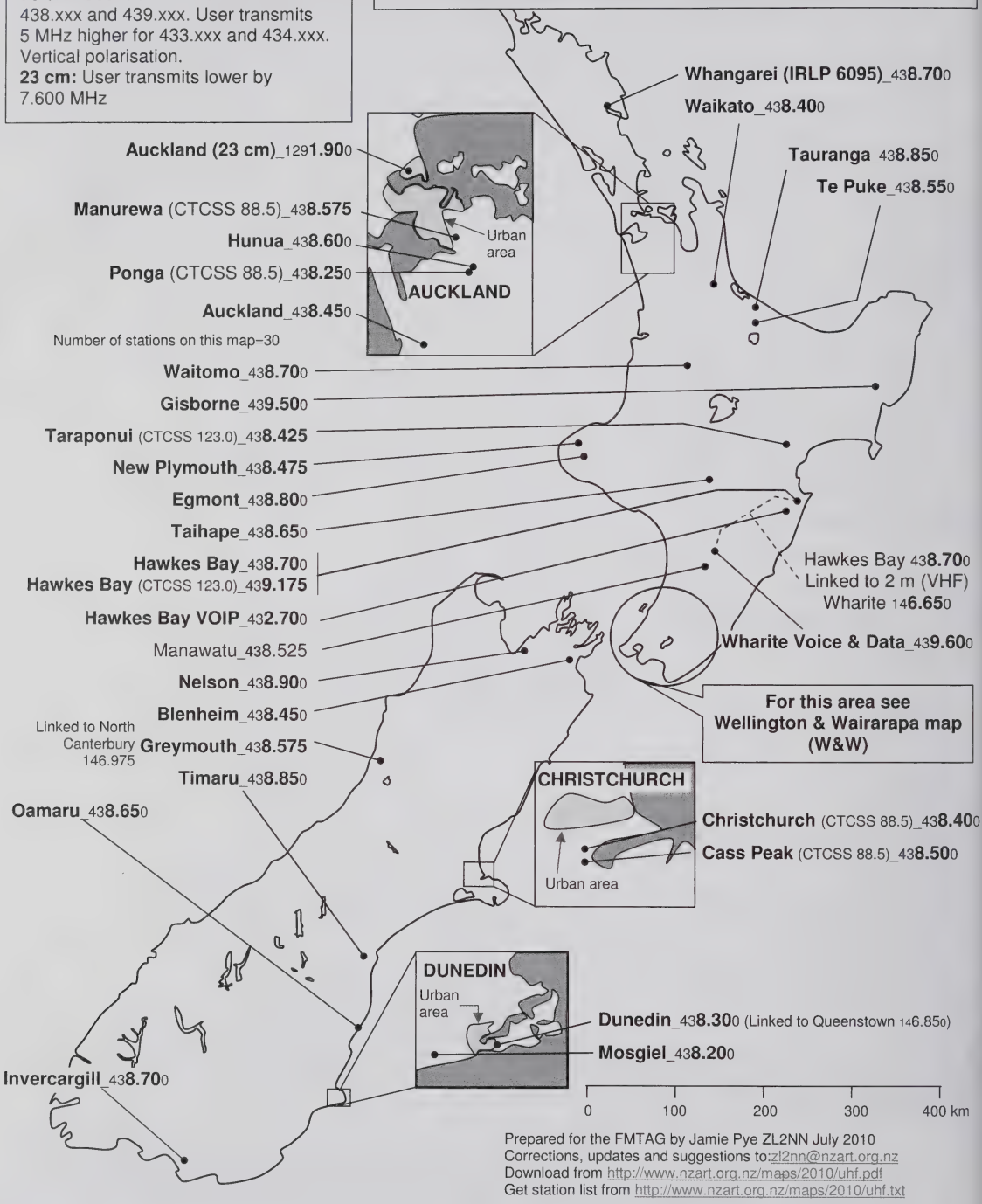
Prepared for the FMTAG by Jamie Pye ZL2NN July 2010
Corrections, updates and suggestions to:zl2nn@nzart.org.nz
Download or view from http://www.nzart.org.nz/maps/2010/v-si.pdf
Get station list from http://www.nzart.org.nz/maps/2010/v-si.txt

New Zealand Amateur Radio 70 & 23 cm (UHF) Repeaters 2010

NOTE 1. The **naming system** is explained on the map **New Zealand Amateur Radio ATV Repeaters 2010.**
2. Repeater **Offsets (splits)** are explained on the map **New Zealand Amateur Radio National System 2010**

70 cm: User transmits 5 MHz lower for 438.xxx and 439.xxx. User transmits 5 MHz higher for 433.xxx and 434.xxx. Vertical polarisation.
23 cm: User transmits lower by 7.600 MHz

National System repeaters are listed on their own page



Prepared for the FMTAG by Jamie Pye ZL2NN July 2010
Corrections, updates and suggestions to:zl2nn@nzart.org.nz
Download from http://www.nzart.org.nz/maps/2010/uhf.pdf
Get station list from http://www.nzart.org.nz/maps/2010/uhf.txt

APRS, BULLETIN BOARDS, DIGIPEATERS & D-STAR

Simplex. Vertical polarisation.

Station Name	Frequency	MED Site Name	Topo50 Map Ref	Branch	Trustee 1	Trustee 2	
Western Suburbs	144.5750	WHAU BRIDGE	BA31 508 136	O3	ZL1VRR	ZL1RCA	
Whitford	144.5750	WHITFORD	BB32 794 088	66	ZL1WTT	ZL1VFO	
Taupo	144.5750	MAROANUI	BF36 634 324	60	ZL1BU	ZL1KU	
Te Kapua	144.5750	TE KAPUA	BG43 242 289		ZL2CC		
Hawkes Bay	144.5750	TARAPONUI	BH38 233 618	13	ZL2AJ	ZL2DW	
Manawatu	144.5750	PAHIATUA TRACK	BM35 316 240	20	ZL2FX	ZL2MAX	
Forest Lakes	144.5750	FOREST LAKES RD	BN33 847 884		ZL2KG	ZL4SJ	
Nelson	144.5750	TAKAKA HILL	BP25 883 586	26	ZL2BCA	ZL2RP	
Wairarapa	144.5750	PARIWHARIKI TRIG	BP35 289 460	46	ZL2BA	ZL4JS	
Nelson	144.5750	FRINGED HILL	BQ26 266 269	26	ZL2BCA	ZL2RP	
Murchison	144.5750	MT MURCHISON	BR23 583 801	26	ZL2BCA	ZL2RP	
Marlborough	144.5750	JAMIES KNOB	BR29 926 969	22	ZL2BK	ZL2WD	
Kaikoura	144.5750	KAIKOURA	BT27 573 033	22	ZL2BK	ZL2WD	
Christchurch	144.5750	MARLEYS HILL	BX24 701 716	O5			N
Timaru	144.5750	MT HORRIBLE	CA19 460 818	34	ZL3GL	ZL3OZ	
North Shore	144.6000	NORTH SHORE CD HQ	BA31 555 317	29	ZL1AUW	ZL1TGC	
Tauranga	144.6250	MINDEN AMATEUR	BD36 692 218	39	ZL1KRH		
Te Puke	144.6250	TOTARA STREET	BD37 810 218	53	ZL1MOF		
Hamilton	144.6500	SEDDON ROAD	BD33 006 165	12	ZL1PK	ZL1GWP	
Waitomo	144.6500	RANGITOTO	BF34 110 510	81	ZL1GWP	ZL1AMW	
Gisborne	144.6500	WHAKAPUNAKE	BH42 992 917	11	ZL2TRG	ZL2HC	
Kapiti	144.6500	MT FIELD	BP32 775 757	69	ZL2GO	ZL4VV	
Greymouth	144.6500	PAPAROA	BT19 636 039	49	ZL3TY	ZL3ADH	
Timaru	144.6500	MT STUDHOLME	CA18 353 531	34	ZL3GL	ZL3OZ	
Queenstown	144.6500	REMARKABLES	CC11 694 014	75	ZL4JW		
Dunedin	144.6500	MACANDREW RD	CE17 060 143	30	ZL4JH	ZL4GR	
Dunedin	144.6500	HIGHCLIFF	CE17 133 163	30	ZL4JH	ZL4GR	
Gore	144.6500	MILLANE ROAD	CF12 916 860	O8	ZL4TCS	ZL4GL	
Innes Road	144.7000	INNES ROAD	BX24 710 838		ZL3BCC		
North Shore	432.6500	NORTH SHORE CD HQ	BA31 555 317	29	ZL1AUW	ZL1TGC	
North Shore	438.3000	NORTH SHORE CD HQ	BA31 555 317	29	ZL1AUW	ZL1TGC	
Auckland	439.5750	MUSICK POINT	BA32 696 201	86	ZL1WOT	ZL1BFB	D-STAR DV
Auckland	1293.6250	MUSICK POINT	BA32 696 201	86	ZL1WOT	ZL1BFB	D-STAR DV
Auckland	1294.6250	MUSICK POINT	BA32 696 201	86	ZL1WOT	ZL1BFB	D-STAR DD

DATA (AND VOICE) REPEATERS

Duplex with normal input/output split. Vertical polarisation.

Station Name	Frequency	MED Site Name	Topo50 Map Ref	Branch	Trustee 1	Trustee 2	
Kapiti Voice and Data 535	145.3500	MT FIELD	BP32 775 757	69	ZL2GO	ZL4VV	
Kaimai Data 540	145.4000	TAKAURUNGA	BD36 583 034	81	ZL1TAT	ZL1THG	
Whangarei Data 5425	145.4250	PARAHAKI	AX30 211 471	28			N
Climie Data 5425	145.4250	MT CLIMIE	BP33 801 431	63	ZL2HM	ZL2BRG	
Auckland Data 5625	145.6250	KLONDYKE ROAD	BC32 602 642	66	ZL1TGC	ZL1BK	
Tararua Voice & Data 5625	145.6250	MT BUTTERS	BN36 572 057	O6	ZL2KA	ZL2KG	LINKED
Hawkins Hill Data 6625	146.6250	HAWKINS HILL	BQ31 450 237	74	ZL3TC	ZL2TVM	
Colonial Knob Voice & Data 7075	147.0750	COLONIAL KNOB	BP31 513 426	74	ZL3TC	ZL4JY	
Wharite Voice & Data 960	439.6000	WHARITE	BM35 431 399	O6	ZL2KA	ZL2KG	LINKED

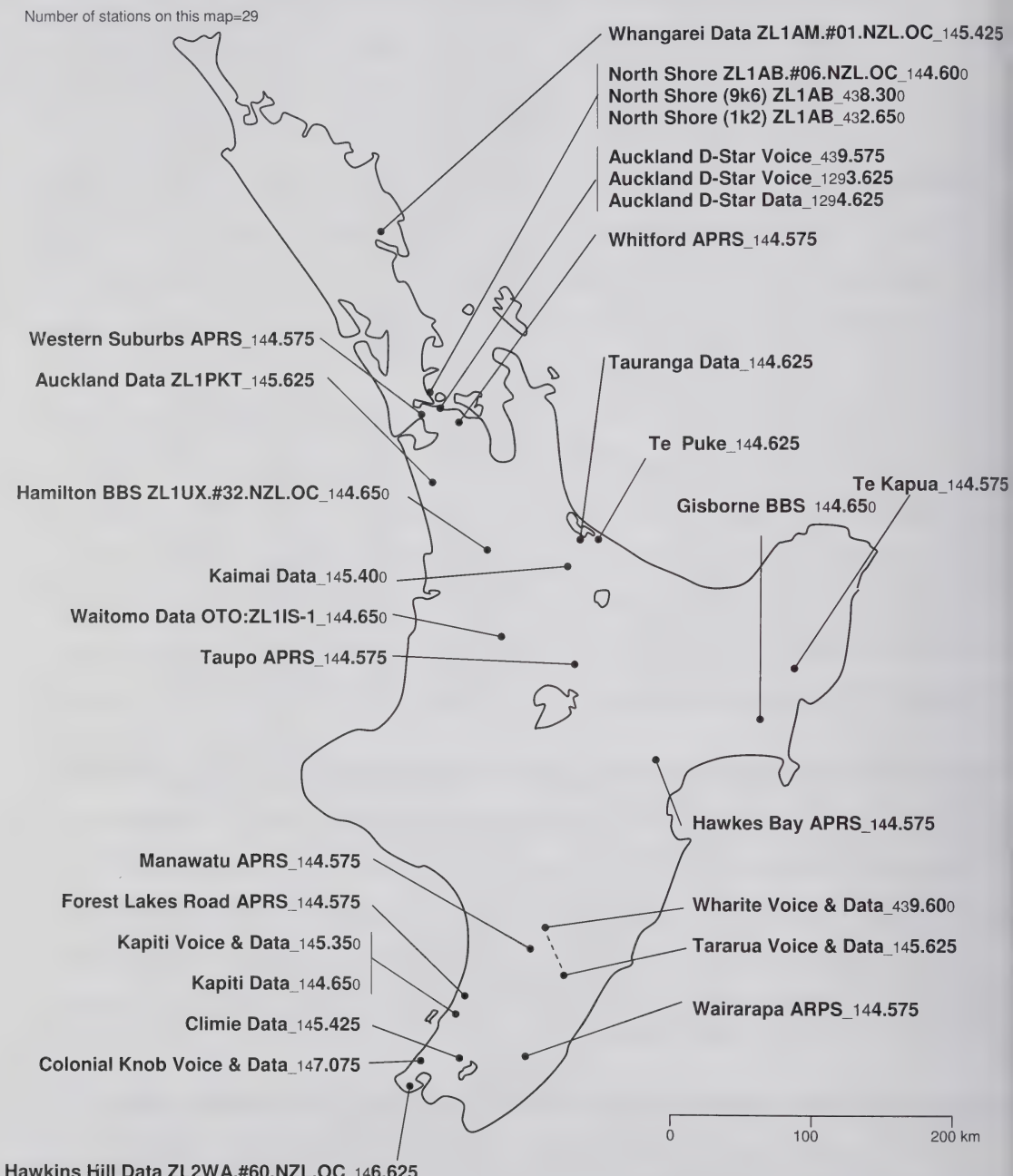
AMATEUR TELEVISION REPEATERS

Station Name	Frequency	MED Site Name	Topo50 Map Ref	Branch	Trustee 1	Trustee 2
Ngaio	431.2500	NGAIO RESERVOIR	BQ31 494 316	74	ZL2HD	ZL2TAR
Whitford	1248.0000	WHITFORD	BB32 794 088	66	ZL1WTT	ZL1QF
Oamaru	1282.0000	CAPE WANBROW	CC18 405 023	64	ZL4DB	ZL4SN

NOTE:
The MED has cancelled all of the Channel 39 Radio Licences and requires operators to apply for Spectrum Licences.

North Island APRS, BBS, Data (& Voice), Digipeaters 2010

NOTE 1. The **naming system** is explained on the map **New Zealand Amateur Radio ATV Repeaters 2010**.
2. **Repeater Offsets (splits)** are explained on the map **New Zealand Amateur Radio National System 2010**



Prepared for the FMTAG by Jamie Pye ZL2NN July 2010
Corrections, updates and suggestions to: zl2nn@nzart.org.nz
Download from http://www.nzart.org.nz/maps/2010/d1-ni.pdf
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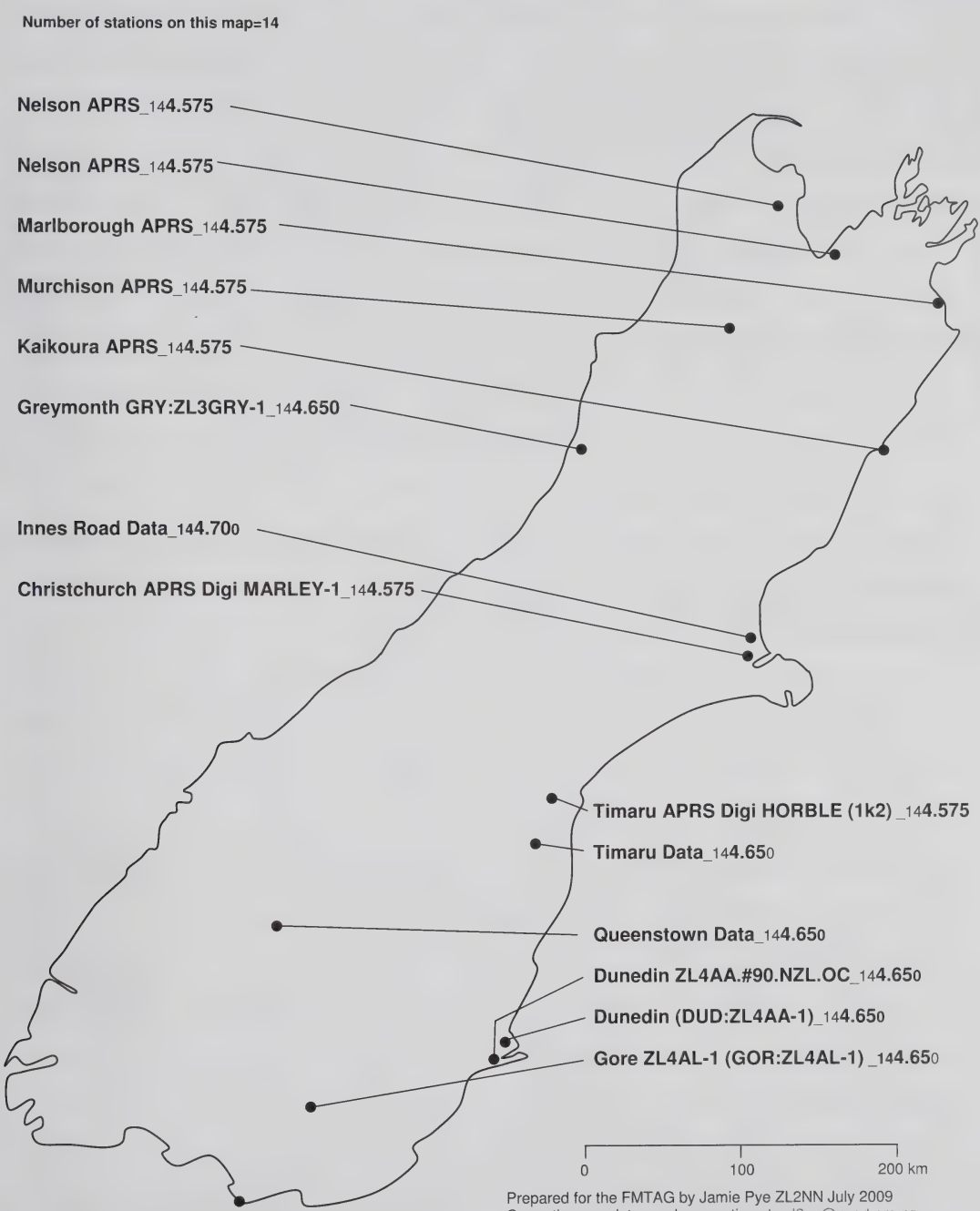
South Island APRS, BBS, Data (& Voice), Digipeaters 2010

NOTE 1. The **naming system** is explained on the map for **New Zealand Amateur Radio ATV Repeaters 2010**.
2. **Repeater Offsets (splits)** are explained on the map for **New Zealand Amateur Radio National System 2010**



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New Zealand Amateur Radio ATV Repeaters 2010

NOTE 1. Repeater Offsets (splits) are explained on the map **New Zealand Amateur Radio National System 2010**
2. The MED has cancelled all of the Channel 39 Radio Licences and requires operators to apply for Spectrum Licences.

Number of stations on this map=3

Naming of Repeaters and Beacons
The repeaters name is split into two parts: The name (this is normally named after the repeater's location) and the frequency of transmission. The frequency is also split into two parts: an abbreviated version and the full transmit frequency in MHz.

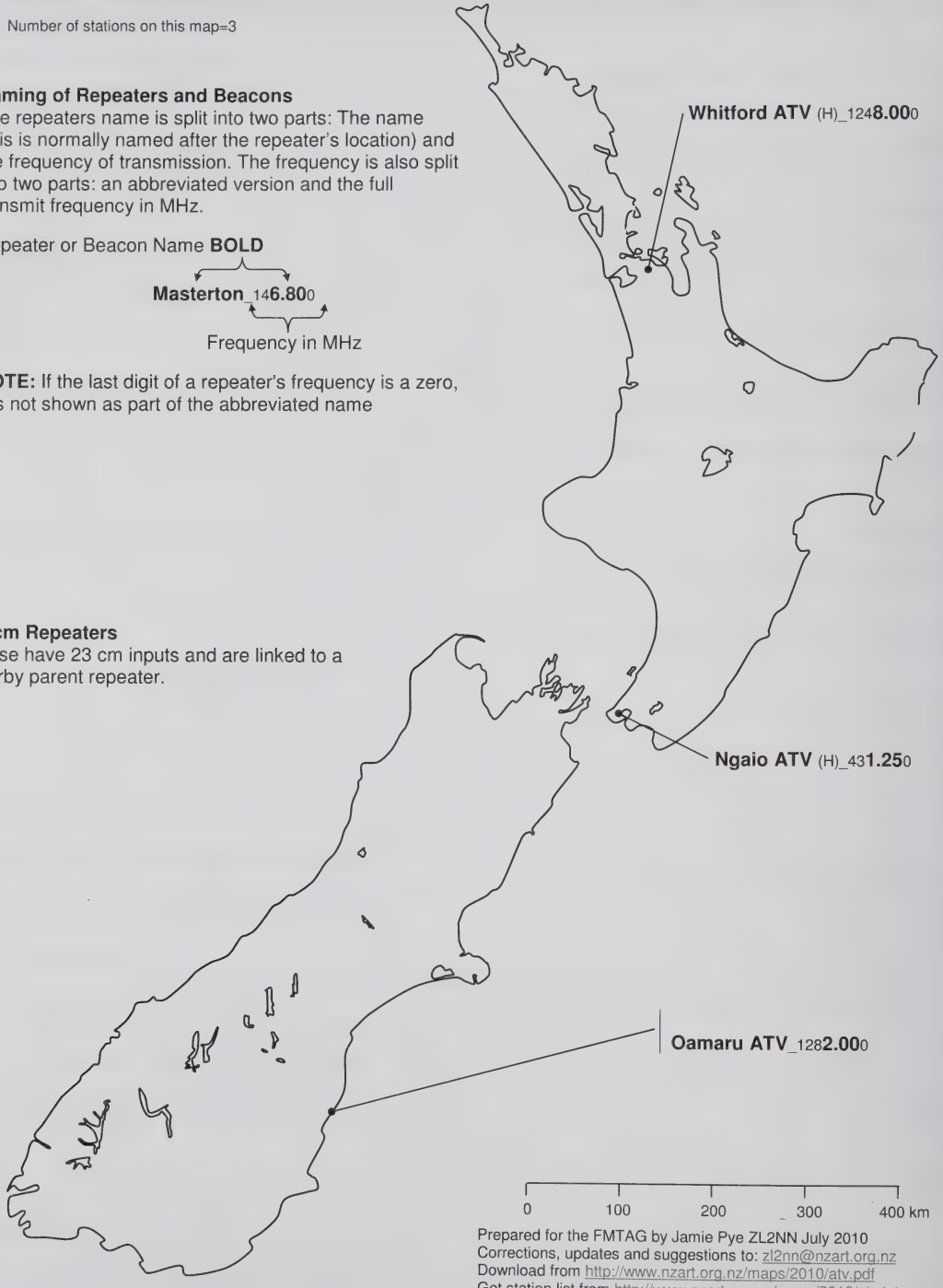
Repeater or Beacon Name **BOLD**

Masterton_146.800

Frequency in MHz

NOTE: If the last digit of a repeater's frequency is a zero, it is not shown as part of the abbreviated name

32 cm Repeaters
These have 23 cm inputs and are linked to a nearby parent repeater.



Prepared for the FMTAG by Jamie Pye ZL2NN July 2010
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NATIONAL SYSTEM REPEATERS

User transmits 5 MHz high to a repeater having an output frequency of 434.xxx MHz. Vertical polarisation.
User transmits 5 MHz low to a repeater having an output frequency of 439.xxx MHz. Vertical polarisation.

Station Name	Frequency	MED Site Name	Topo50 Map Ref	Branch	Trustee 1	Trustee 2	
Kaimai 485	434.8500	TAKAURUNGA	BD36 582 034	81	ZL1GWP	ZL3GR	
Mt Erin 485	434.8500	MT ERIN	BK39 291 940	25	ZL2TC	ZL2DW	
Blue Duck 485	434.8500	BLUE DUCK	BT28 653 275	O5			N
Balclutha 485	434.8500	MT STUART	CF15 504 924	35	ZL4AS	ZL4TL	
Doubtless Bay 490	434.9000	RANGIAWHIA	AU26 357 416	78			N
Egmont 490	434.9000	MT EGMONT	BJ29 935 505	74	ZL2KG	ZL4JY	
Waitaki 490	434.9000	MT STUDHOLME	CA18 353 531	34	ZL3GL	ZL3OZ	
Brynderwyn 495	434.9500	PILBROW HILL	AY30 277 076	28			N
Wairarapa 495	434.9500	PARIWHARIKI TRIG	BP35 289 460	46	ZL2BA	ZL4JS	C
Murchison 495	434.9500	MT MURCHISON	BR23 583 801	26	ZL2BCA	ZL2RP	
Taupo 9825	439.8250	MAROANUI	BF36 634 324	74	ZL1BU	ZL2KG	
Auckland 9875	439.8750	KLONDYKE ROAD	BC32 602 642	66	ZL1TGC	ZL1BK	
Gisborne 9875	439.8750	WHAKAPUNAKE	BH42 992 917	11	ZL2TRG	ZL2HC	
Wanganui 9875	439.8750	LANDGUARD	BL32 730 750	48			N
Belmont 9875	439.8750	MT BELMONT	BQ32 569 399	74	ZL3TC	ZL2TVM	
Greymouth 9875	439.8750	SEWELL PEAK	BT19 636 036	49	ZL3ADH	ZL3TY	
Christchurch 9875	439.8750	MARLEYS HILL	BX24 704 714	O5			N
Whangarei 9925	439.9250	PARAHAKI	AX30 211 471	28			N
Rotorua 9925	439.9250	WHAKAPOUNGAKAU	BE37 979 784	33	ZL1PJ	ZL1BWC	
Rangitoto	439.9250	RANGITOTO	BF34 110 510	55	ZL4SQ	ZL1HJ	
Kapiti 9925	439.9250	MT FIELD	BP32 775 757	69	ZL2GO	ZL4VV	
Nelson 9925	439.9250	GRAMPIANS	BQ26 234 283	26	ZL2BCA	ZL2RP	
Dunedin 9925	439.9250	MT CARGILL	CE17 101 239	30	ZL4JH	ZL4GR	
Bay of Isklands 9975	439.9750	MANGINANGINA	AV28 734 034	84	ZL1IU	ZL1RS	
Hamilton 9975	439.9750	HAMILTON	BD33 027 103	81	ZL1TAT	ZL1THG	
Edgecumbe 9975	439.9750	MT EDGECUMBE	BE39 277 759	67	ZL1CAY	ZL1OW	
Wharite 9975	439.9750	WHARITE	BM35 429 399	74	ZL2KG	ZL3TC	

BEACONS

Callsign	Station Name	Frequency	MED Site Name	Topo50 Map Ref	Branch	Trustee 1	Trustee 2	
ZL6B	IBP, NCDX	14.1000	GLADSTONE ROAD	BP34 181 532	46	ZL2FC		
ZL6B	IBP, NCDX	18.1100	GLADSTONE ROAD	BP34 181 532	46	ZL2FC		
ZL6B	IBP, NCDX	21.1500	GLADSTONE ROAD	BP34 181 532	46	ZL2FC		
ZL6B	IBP, NCDX	24.9300	GLADSTONE ROAD	BP34 181 532	46	ZL2FC		
ZL6B	IBP, NCDX	28.2000	GLADSTONE ROAD	BP34 181 532	46	ZL2FC		
	Upper Hutt 10 m	28.2290	MT CLIMIE	BP33 801 431	63	ZL2HM	ZL2BRG	
ZL3MHB	Greymouth 6 m	50.0525	GREYMOUTH	BT19 532 986	49	ZL3TY	ZL3ADH	
ZL2MHB	Hawkes Bay 6 m	51.0300	LATHAM ST	BK39 354 197	25	ZL2TC	ZL2DW	
	Upper Hutt 6 m	52.2750	MT CLIMIE	BP33 801 431	63	ZL2HM	ZL2BRG	
ZL2SIX	Blenheim 6 m	52.4900	WITHER HILLS	BR28 821 999	22	ZL2BK	ZL2WD	
	Auckland 2 m	144.2530	NIHOTUPU	BA31 402 115	66	ZL1QF	ZL1WTT	
ZL1VHW	Waikato 2 m	144.2560	HAMILTON CITY	BD33 006 165	81	ZL1THG	ZL1UJG	C
	Hawkins Hill 2 m	144.2750	HAWKINS HILL	BQ31 450 237	74	ZL3TC	ZL2TVM	
ZL3VHF	Christchurch 2 m	144.2850	GALBRAITH AVE	BX24 732 818	O5			N
	Hokitika 2 m	144.2860	HOKITIKA	BU18 327 684	49	ZL3TY	ZL3ADH	
ZL2VHT	New Plymouth 2 m	145.2250	OTARAOA ROAD	BH30 132 751	27	ZL2BR	ZL2BZH	
ZL2MHB	Hawkes Bay 2 m	145.2400	LATHAM ST	BK39 354 197	25	ZL2TC	ZL2DW	
	Auckland 70 cm	432.2530	NIHOTUPU	BA31 402 115	66	ZL1QF	ZL1WTT	
ZL1VHW	Waikato 70 cm	432.2560	HAMILTON CITY	BD33 006 165	81	ZL1THG	ZL1UJG	C
	Hawkins Hill 70 cm	432.2750	HAWKINS HILL	BQ31 450 237	74	ZL3TC	ZL2TVM	
ZL3UHF	Christchurch 70 cm	432.2850	GALBRAITH AVE	BX24 732 818	O5			N
ZL2VHT	New Plymouth 70 cm	433.2250	OTARAOA ROAD	BH30 132 751	27	ZL2BR	ZL2BZH	
ZL2UHF	Lower Hutt 32 cm	925.2750	LOWER HUTT	BQ32 576 362	74	ZL2TAR	ZL2TAK	
ZL1VHW	Waikato 23 cm	1296.2560	HAMILTON CITY	BD33 006 165	81	ZL1THG	ZL1UJG	C
	Hawkins Hill 23 cm	1296.2750	HAWKINS HILL	BQ31 450 237	74	ZL3TC	ZL2TVM	
ZL2UHV	Lower Hutt 12 cm	2402.2750	BIRCH ST	BQ32 611 359	18	ZL2TVM	ZL2TWS	
	Waikato 12 cm	2424.2600	TAKAURUNGA	BD36 582 034	81	ZL1THG	ZL1UJG	
ZL1SHF	Muriwai 5 cm	5765.0000	MURIWAI	BA30 288 209	74	ZL1TBG	ZL1AVZ	
ZL2UHF	Hawkins Hill 3 cm	10250.0000	HAWKINS HILL	BQ31 450 237	74	ZL3TC	ZL2TVM	
ZL2SHF	Hawkins Hill 12 mm	24150.0000	HAWKINS HILL	BQ31 450 237	74	ZL3TC	ZL2TVM	

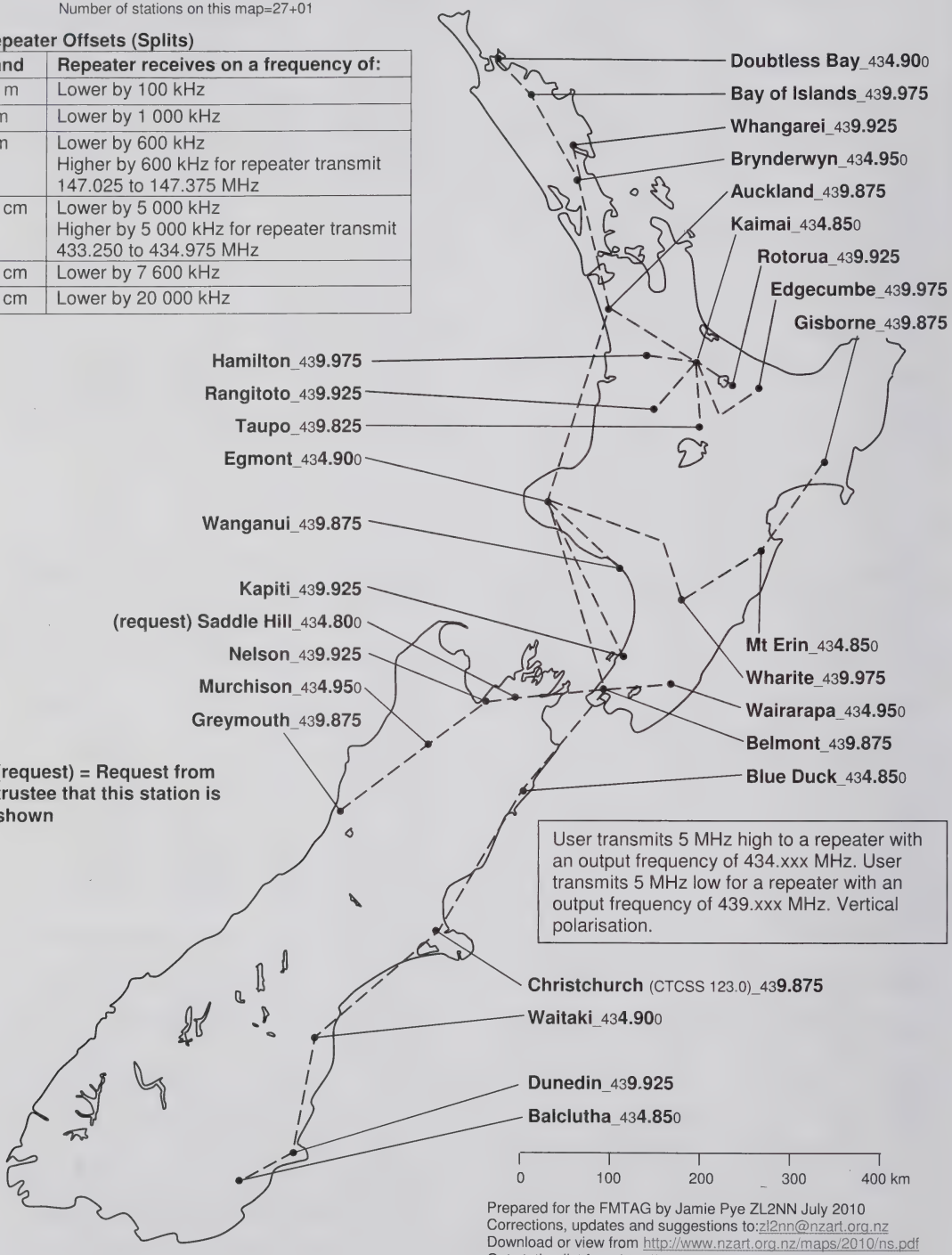
New Zealand Amateur Radio National System 2010

NOTE 1. The **naming system** is explained on the map for **New Zealand Amateur Radio ATV Repeaters 2010**

Number of stations on this map=27+01

Repeater Offsets (Splits)

Band	Repeater receives on a frequency of:
10 m	Lower by 100 kHz
6 m	Lower by 1 000 kHz
2 m	Lower by 600 kHz Higher by 600 kHz for repeater transmit 147.025 to 147.375 MHz
70 cm	Lower by 5 000 kHz Higher by 5 000 kHz for repeater transmit 433.250 to 434.975 MHz
32 cm	Lower by 7 600 kHz
23 cm	Lower by 20 000 kHz



Prepared for the FMTAG by Jamie Pye ZL2NN July 2010
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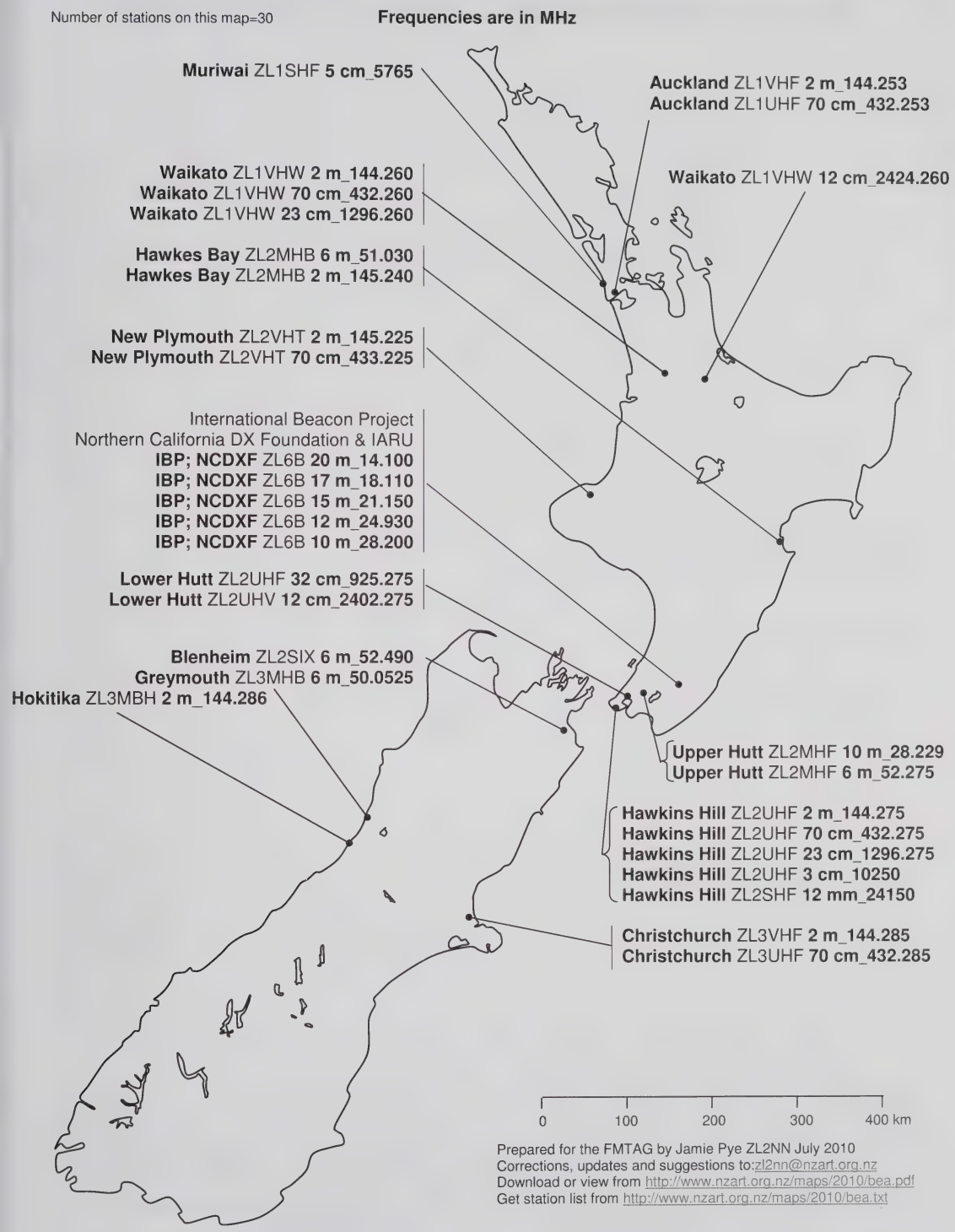
New Zealand Amateur Radio Beacons 2010


Number of stations on this map=30
Frequencies are in MHz
Muriwai ZL1SHF 5 cm_5765
Auckland ZL1VHF 2 m_144.253
Auckland ZL1UHF 70 cm_432.253
Waikato ZL1VHW 2 m_144.260
Waikato ZL1VHW 70 cm_432.260
Waikato ZL1VHW 23 cm_1296.260
Waikato ZL1VHW 12 cm_2424.260
Hawkes Bay ZL2MHB 6 m_51.030
Hawkes Bay ZL2MHB 2 m_145.240
New Plymouth ZL2VHT 2 m_145.225
New Plymouth ZL2VHT 70 cm_433.225
International Beacon Project
Northern California DX Foundation & IARU
IBP; NCDXF ZL6B 20 m_14.100
IBP; NCDXF ZL6B 17 m_18.110
IBP; NCDXF ZL6B 15 m_21.150
IBP; NCDXF ZL6B 12 m_24.930
IBP; NCDXF ZL6B 10 m_28.200
Lower Hutt ZL2UHF 32 cm_925.275
Lower Hutt ZL2UHV 12 cm_2402.275
Blenheim ZL2SIX 6 m_52.490
Greymouth ZL3MHB 6 m_50.0525
Hokitika ZL3MBH 2 m_144.286
Upper Hutt ZL2MHF 10 m_28.229
Upper Hutt ZL2MHF 6 m_52.275
Hawkins Hill ZL2UHF 2 m_144.275
Hawkins Hill ZL2UHF 70 cm_432.275
Hawkins Hill ZL2UHF 23 cm_1296.275
Hawkins Hill ZL2UHF 3 cm_10250
Hawkins Hill ZL2SHF 12 mm_24150
Christchurch ZL3VHF 2 m_144.285
Christchurch ZL3UHF 70 cm_432.285
0
100
200
300
400 km

Prepared for the FMTAG by Jamie Pye ZL2NN July 2010
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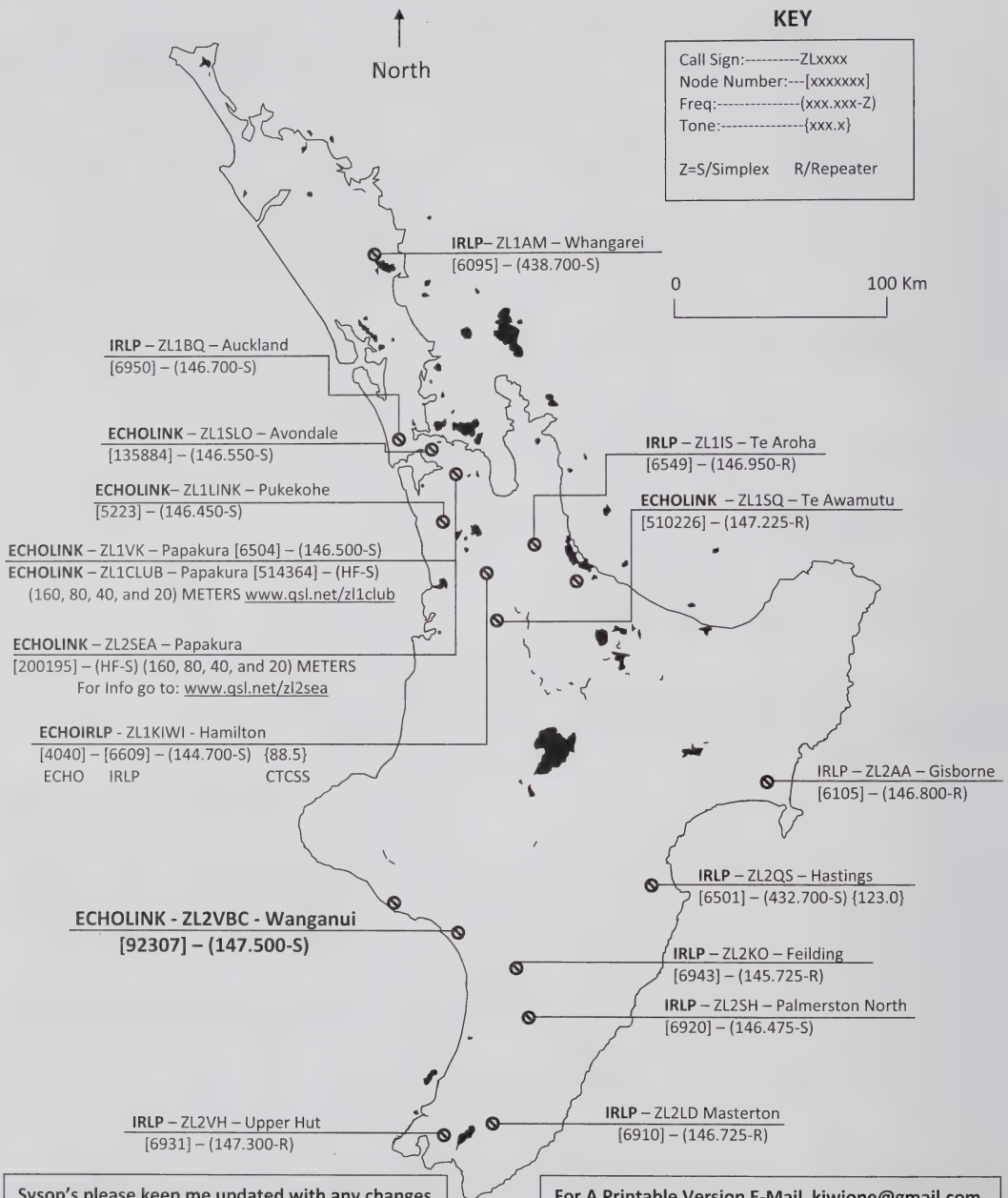
Maybe this will encourage people to contact me.

New Zealand Amateur Radio VoIP Systems


North
KEY
Call Sign:----------ZLxxxx
Node Number:---[xxxxxxx]
Freq:----------(xxx.xxx-Z)
Tone:----------{xxx.x}
Z=S/Simplex R/Repeater
0
100 Km
IRLP– ZL1AM – Whangarei
[6095] – (438.700-S)
IRLP – ZL1BQ – Auckland
[6950] – (146.700-S)
ECHOLINK – ZL1SLO – Avondale
[135884] – (146.550-S)
ECHOLINK– ZL1LINK – Pukekohe
[5223] – (146.450-S)
ECHOLINK – ZL1VK – Papakura [6504] – (146.500-S)
ECHOLINK – ZL1CLUB – Papakura [514364] – (HF-S)
(160, 80, 40, and 20) METERS www.qsl.net/zl1club
ECHOLINK – ZL2SEA – Papakura
[200195] – (HF-S) (160, 80, 40, and 20) METERS
For Info go to: www.qsl.net/zl2sea
ECHOIRLP - ZL1KIWI - Hamilton
[4040] – [6609] – (144.700-S) {88.5}
ECHO IRLP CTCSS
IRLP – ZL1IS – Te Aroha
[6549] – (146.950-R)
ECHOLINK – ZL1SQ – Te Awamutu
[510226] – (147.225-R)
IRLP – ZL2AA – Gisborne
[6105] – (146.800-R)
IRLP – ZL2QS – Hastings
[6501] – (432.700-S) {123.0}
ECHOLINK - ZL2VBC - Wanganui
[92307] – (147.500-S)
IRLP – ZL2KO – Feilding
[6943] – (145.725-R)
IRLP – ZL2SH – Palmerston North
[6920] – (146.475-S)
IRLP – ZL2VH – Upper Hut
[6931] – (147.300-R)
IRLP – ZL2LD Masterton
[6910] – (146.725-R)

Sysop's please keep me updated with any changes

For A Printable Version E-Mail kiwione@gmail.com

Prepared By Cyril Rosewarne ZL2VBC Sept 2010

http://homepages.xnet.co.nz/~rosvonne/EcholinkWebpage/echolink.html

North Island Link South Island Link

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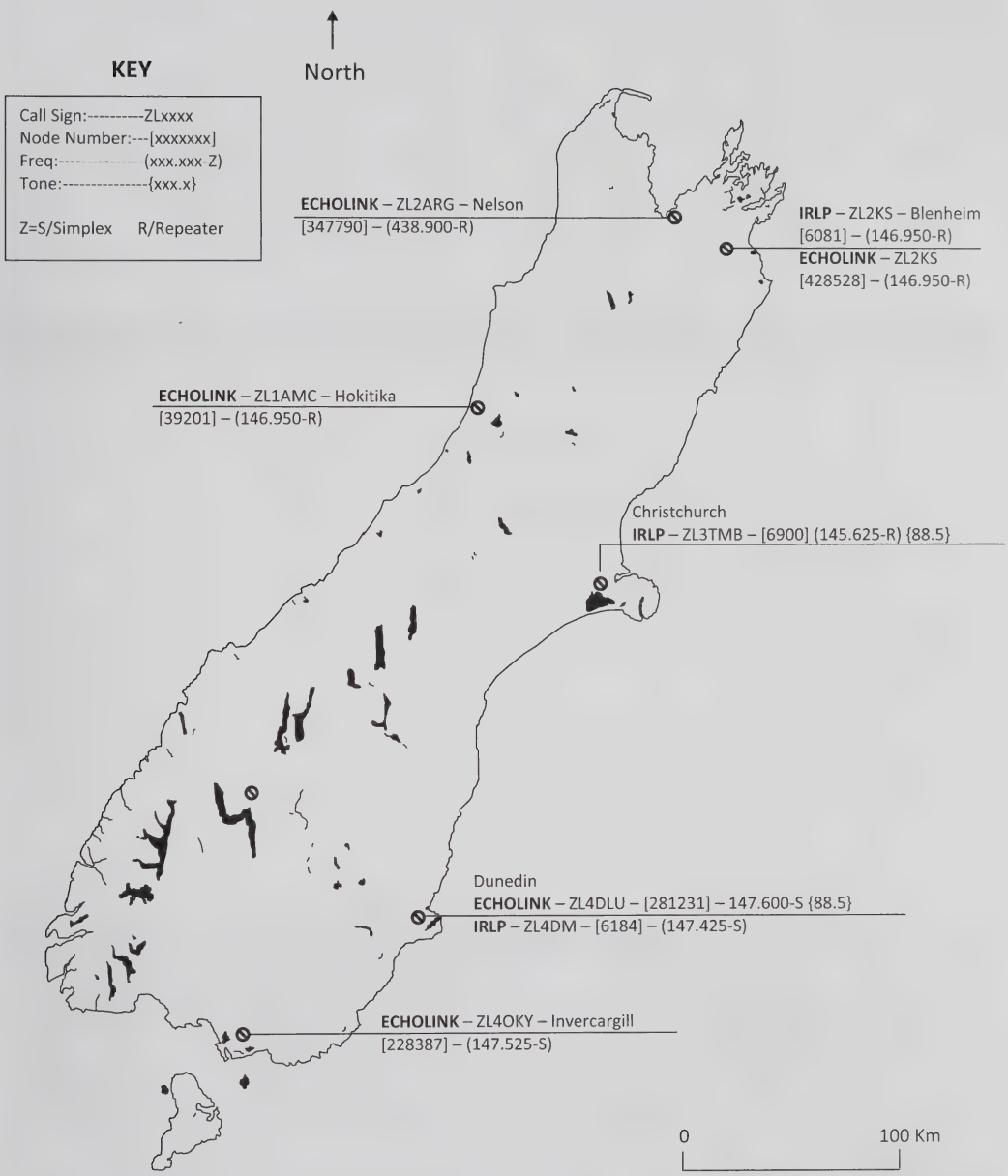
New Zealand Amateur Radio VoIP Systems



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Prepared By Cyril Rosewarne ZL2VBC June 2010

http://homepages.xnet.co.nz/~rosvonne/EcholinkWebpage/echolink.html

North Island Link South Island Link

SHORT TERM SPECIAL PURPOSE (STSP) REPEATERS

Most Branches have cancelled their individual STSP Licences, and are now taking advantage of MED Licence 209732.
CONDITIONS OF LICENCE 209732:
Transmit Frequencies: 146.675, 146.725, 146.825, 146.875, 146.925, 438.625, 438.675, 438.725, 438.750, 438.775 MHz.
Standard input/output frequency offsets.
17 dBW (50 Watts) maximum e.i.r.p.
STSP repeaters must not cause interference to other licensed services.
Only STSP repeaters are permitted under this licence.
The maximum permitted operating duration is 14 days.
The minimum inter-antenna spacing, between the STSP repeater antenna and the antenna of any other communications service, is 50 metres; otherwise ALL NEW ZEALAND.
The following Branches have retained their individual STSP Licences:

Frequency	Location	Topo50 Map Ref	Branch	Trustee 1	Trustee 2	Note
145.3250	SEDDON ROAD	BD33 006 165	12	ZL1PK	ZL1GWP	
146.9250	BLENHEIM	BQ28 759 086	22	ZL2BK	ZL2WD	
147.2750	CHRISTCHURCH	BY21 005 386	05			N
438.6250	DODSON VALLEY	BQ26 270 345	26	ZL2BCA	ZL2RP	

SIMPLEX AND CALLING FREQUENCIES

144.100	Oceania SSB Calling
144.200	NZ SSB Calling
144.500	FM Calling
144.550	Narrow digital mode simplex of up to 16 kHz bandwidth
144.575	Data Simplex and APRS
144.600	Primary data/packet port linked to Digital National System
144.625	Secondary data/packet port linked to Digital National System
144.650	Primary local data/packet store/forward
144.675	Secondary local data/packet store/forward
144.700	Voice-over Internet Simplex
145.250	Narrow band picture modes: FAX, Hellschriber, SSTV, etc.
146.425 to 146.600	FM Simplex
147.400 to 147.475	FM Simplex
147.500	Tertiary local data/packet store/forward
147.525 to 147.600	FM Simplex
432.200	SSB Calling
432.500	FM Calling
432.550	Narrow digital mode simplex of up to 16 kHz bandwidth
432.575	Data Simplex and APRS
432.600	Primary data/packet port linked to Digital National System
432.625	Secondary data/packet port linked to Digital National System
432.650	Primary local data/packet store/forward
432.675	Secondary local data/packet store/forward
432.700	Voice-over Internet Simplex
438.300	Tertiary local data/packet store/forward
1294.125	Wide digital mode simplex of up to 250 kHz bandwidth

Above 432 MHz use the following as a guide to designated frequencies:
F to F+1 MHz for standard narrow band or weak signal segment, Where F = 432, 621, 925, 1296, 2424, 3399, 5760, 10368, 24192, 47088, 80640 MHz.

F+0.200	SSB Calling
F+0.250 to 0.300	Beacons (geographic plan, 1 kHz spacing)
F+0.500	FM Calling
F+0.550	Narrow digital mode simplex of up to 16 kHz bandwidth
F+0.575	Data Simplex and APRS
F+0.600	Primary data/packet port linked to Digital National System
F+0.625	Secondary data/packet port linked to Digital National System
F+0.650	Primary local data/packet store/forward
F+0.675	Secondary local data/packet store/forward
F+0.700	Voice-over Internet Simplex

The NCDXF, in co-operation with the IARU, constructed and operates a worldwide network of high-frequency radio beacons on 14.100, 18.110, 21.150, 24.930 and 28.288MHz. These beacons help both amateur and commercial high-frequency radio users assess the current condition of the ionosphere. The entire system is designed, built and operated by volunteers at no cost except the actual price of hardware components, shipping costs, and so on.

In principle, one can simple listen on the beacon frequencies and copy the CW call-signs of the various beacons to figure out where the band is open, but in practice, not every ham operator can copy calls at twenty-two words per minute and some beacons may be heard at too low a signal strength to catch the call. Becuase the beacons transmit at known times, it is easy to know which beacon one is hearing without actually copying the CW call-sign. Since the beacons are running 100W to a vertical, even a weak beacon signal may indicate a path with excellent propagation for stations using higher power and directive antennas.

For the latest information see the NCDXF website at <http://www.ncdxf.org/beacons.html>.

Table 1. NCDXF/IARU Beacon Transmission Schedule

As at August 2010.

This table gives the minute and second within each hour of the start of the first transmission of each of beacon on each frequency. Each transmission is repeated every three minutes. A transmission consists of the callsign of the beacon sent at 22 words per minute followed by four one-second dashes. The callsign and the first dash are sent at 100 watts. The remaining dashes are sent at 10 watts, 1 watt and 0.1 watts.

Slot	Country	Call	14.100	18.110	21.150	24.930	28.200	Operator
1	United Nations	4U1UN	00:00	00:10	00:20	00:30	00:40	UNRC
2	Canada	VE8AT	00:10	00:20	00:30	00:40	00:50	RAC/NARC
3	United States	W6WX	00:20	00:30	00:40	00:50	01:00	NCDXF
4	Hawaii	KH6WO	00:30	00:40	00:50	01:00	01:10	KH6BYU
5	New Zealand	ZL6B	00:40	00:50	01:00	01:10	01:20	NZART
6	Australia	VK6RBP	00:50	01:00	01:10	01:20	01:30	WIA
7	Japan	JA2IGY	01:00	01:10	01:20	01:30	01:40	JARL
8	Russia	RR9O	01:10	01:20	01:30	01:40	01:50	SRR
9	Hong Kong	VR2B	01:20	01:30	01:40	01:50	02:00	HARTS
10	Sri Lanka	4S7B	01:30	01:40	01:50	02:00	02:10	RSSL
11	South Africa	ZS6DN	01:40	01:50	02:00	02:10	02:20	ZS6DN
12	Kenya	5Z4B	01:50	02:00	02:10	02:20	02:30	ARSK
13	Israel	4X6TU	02:00	02:10	02:20	02:30	02:40	IARC
14	Finland	OH2B	02:10	02:20	02:30	02:40	02:50	SRAL
15	Madeira	CS3B	02:20	02:30	02:40	02:50	00:00	ARRM
16	Argentina	LU4AA	02:30	02:40	02:50	00:00	00:10	RCA
17	Peru	OA4B	02:40	02:50	00:00	00:10	00:20	RCP
18	Venezuela	YV5B	02:50	00:00	00:10	00:20	00:30	RCV

Table 2. NCDXF/IARU Beacon Locations

Slot	Country	Call	Location	Latitude	Longitude	Grids
1	United Nations	4U1UN	New York City	40° 45' N	73° 58' W	FN30as
2	Canada	VE8AT	Eureka, Nunavut	79° 59' N	85° 57' W	EQ79ax
3	United States	W6WX	Mt. Umunhum	37° 09' N	121° 54' W	CM97bd
4	Hawaii	KH6WO	Laie	21° 38' N	157° 55' W	BL11ap
5	New Zealand	ZL6B	Masterson	41° 03' S	175° 36' E	RE78tw
6	Australia	VK6RBP	Rolystone	32° 06' S	116° 03' E	OF87av
7	Japan	JA2IGY	Mt. Asama	34° 27' N	136° 47' E	PM84jk
8	Russia	RR90	Novosibirsk	54° 59' N	82° 54' E	NO14kx
9	Hong Kong	VR2B	Hong Kong	22° 16' N	114° 09' E	OL72bg
10	Sri Lanka	4S7B	Colombo	60° 6' N	80° 13' E	NJ06cc
11	South Africa	ZS6DN	Pretoria	25° 54' S	28° 16' E	KG44dc
12	Kenya	5Z4B	Kariobangi	1° 15' S	36° 53' E	KI88ks
13	Israel	4X6TU	Tel Aviv	32° 03' N	34° 46' E	KM72jb
14	Finland	OH2B	Lohja	60° 19' N	24° 50' E	KP20
15	Madeira	CS3B	Santo da Serra	32° 43' N	16° 48' W	IM12Or
16	Argentina	LU4AA	Buenos Aires	34° 37' S	58° 21' W	GF05tj
17	Peru	OA4B	Lima	12° 04' S	76° 57' W	FH17mw
18	Venezuela	YV5B	Caracas	10° 25' N	66° 51' W	FK60nj

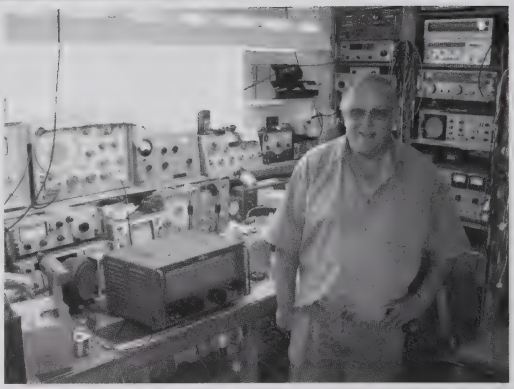
Question a gathering of hams, and one will inevitably find that several were once DXers or shortwave listeners before they moved on to join the ranks of amateur radio. Many listeners progress no further than just being listeners, a few becoming serious DXers, but for some the novelty of talking to the world draws them into amateur radio. Those who have progressed through the hobby of DXing have acquired much of the basic radio theory, and are better prepared for the study required for sitting the amateur radio exam.

The similarities between the two hobbies are numerous. The bands that DXers monitor range from VLF to VHF. The modes range from AM to FM. With the increasing use of computers, digital reception is gaining interest. However, despite the widening range of options, listening to shortwave broadcasts still remains the most popular activity.

Like amateur radio, the equipment used over the years has changed. Gone are the days when the dual band household radio served as the DX receiver. After the war, DXers used war-surplus radio sets such as the Marconi R1155, ARC5 and Bendix MN26C compass receiver. Gradually, valve communication receivers, such as the Eddystone and Hallicrafters became available and affordable. Today, like the amateur, we are in the digital age, with sophisticated receivers ranging from the small portable SONY 7600G to the ICOM R7x series and the professional NRD545 communications receivers and latterly a variety of Software Defined Radios (SDR) or PC Controlled Radios (PCR). There has been an increase in the number of small sized, lower priced analogue and digital portable receivers being manufactured under a variety of names so there should be something to suit all budgets. Over the years amateur equipment has developed to an even greater extent, with many hams using multi-functional transceivers which incorporate all-band general coverage reception.

Unlike the amateurs, the antennas used by the DXer over the years have changed little. The fortunate few who have the space to run out a Beverage still chase the elusive medium wave DX. Most persevere with an end-fed wire or a dipole. Those DXers living in high noise suburbia may try and develop low-noise antennas like the EWE or Flag types. Like amateur radio there is great scope for development, but we do tend to lack the technical expertise that the ham fraternity can draw upon. Because of the wide range of shortwave bands, the DXer does have great difficulty designing a multi-band antenna. However, with regard to propagation, I feel that any top DXer can "hold their own" with a ham DXer. Propagation is just as important to both hobbies. We complain about band conditions just as much as the ham down the road.

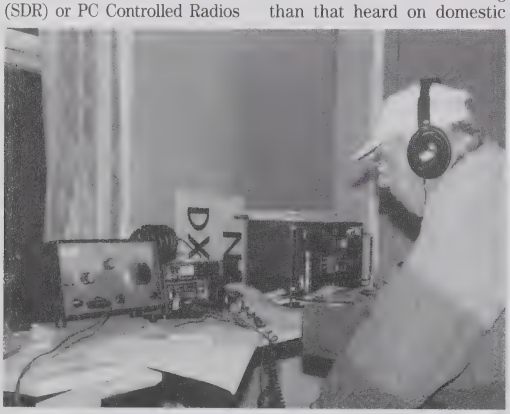
For many shortwave listeners, the QSLing of reception reports is the whole purpose of it all. But more and more, verification is becoming less important and just hearing the station and programme is the enjoyment. The variety of programmes heard over international broadcasters is far more varied and interesting than that heard on domestic radio. Nevertheless, serious DXing is still the backbone of the hobby, and the thrill of hearing and finally verifying a rare low powered station from some exotic country, is no different than that experienced by an amateur DXer.



NZ Radio DX League member Gordon Baker of Tauranga, DXer and collector of communications receivers, with a venerable Eddystone 680X receiver on his radio shack workbench.(2005)

DXing in New Zealand is almost as old as amateur radio, with the first DX club being formed in 1931. Although the New Zealand DX Club folded in the late 1940s, two other DX clubs are still active; the New Zealand DX Radio Association, now over 70 years old, and the New Zealand Radio DX League, which celebrated its 60th anniversary in 2008.

Amateur radio, like other hobbies, loses many participants to other pastimes and interests. This loss of interest in some cases may be due to boredom or burnout with the hobby. New horizons and challenges may be needed. We all get stale or frustrated at some time. May it be suggested to those amateurs who feel they need a variation or change, but still retain their interest in wireless, is that they consider shortwave listening? Some hams that entered amateur radio through the hobby of DXing might consider revisiting it. Most hams have an antenna and a rig capable of general coverage reception. It might be worthwhile tuning a bit further than just the ham bands. Start listening to the world of International Shortwave Broadcasting. Both hobbies fit nicely together, as found in Auckland where the Western Suburbs Radio Club allows the Auckland Branch of the New Zealand Radio DX League to hold its monthly meetings in their clubrooms. In return, Branch 03 has gained several newly licensed hams from the ranks of the DXers. Try listening to a few broadcasts or download a sample of the New Zealand Radio DX League's monthly magazine, the NZ DX TIMES from the New Zealand Radio DX League's own Internet site at <www.radiodx.com>, which is a great starting point for anyone interested in shortwave listening. Information on how to join the NZ Radio DX League and membership options can be found here. I have found that shortwave listening and amateur radio complement each other and have helped maintain my interest in both hobbies for many years.



Peter Grenfell of Oamaru, Life Member of the NZ Radio DX League, DXing with an Icom communications receiver at the League's famous Tiwai (Southland) Listening Post (2003). Other receivers shown - Drake SPR4 and Grundig Satellit.

Bryan Clark, Vice President of the NZ Radio DX League, chasing rare DX whilst mobile with an AOR7030+ communications receiver and ground Beverage antenna (BOG) at Mangawhai Northland (2003)

NEW ZEALAND COASTAL MARITIME RADIO STATIONS

Maritime Radio Service

For seafarers, their main lifeline to land is the ship's radio.

Maritime New Zealand (MNZ) is responsible for maintaining VHF and HF radio services for New Zealand's coastal waters and the South Pacific, providing around-the-clock monitoring of radio frequencies for distress messages. The region covered by the New Zealand distress and radio safety service is known as NAVAREA XIV, covering 12.5% of the earth's ocean surface. It extends from mid-Tasman to mid-Pacific and from the Antarctica to the Equator.

MNZ is also responsible for the broadcast of Maritime Safety Information (MSI) within the NAVAREA. The MSI includes meteorological information, coastal and oceanic navigational warnings, and ionospheric prediction forecasts.

The service provided by MNZ is complemented by a network of volunteer private radio operators around New Zealand and its offshore islands.

The radio network is monitored by staff located at the Maritime Operations Centre (MOC) in Lower Hutt on a 24/7 basis.

The Maritime Radio Service consists of 30 coastal VHF stations. Twenty eight of these stations provide VHF radio coverage throughout the coastal waters surrounding New Zealand. The other two stations provide VHF radio coverage in the coastal waters surrounding the Chatham Islands. There is also an oceanic MF/HF radio station located to the east of Lake Taupo. All the stations are linked to MOC, which is co-located with the Rescue Coordination Centre New Zealand (RCCNZ). MOC co-ordinates the transmission of all MSI over the INMARSAT SafetyNET satellite system, and by voice on HF and VHF.

The scheduled broadcast times, channels and frequencies are detailed below.

TABLES OF SSB FREQUENCIES & VHF CHANNELS

All ships licensed to operate in the marine frequency bands between 1605kHz and 2850kHz must be able to transmit and receive on 2182kHz. Distress, urgency and safety calls should be made on this frequency. The 2182kHz frequency is also the general calling and reply frequency when establishing communication with ship and coastal stations and for use by coastal stations to announce the transmission, on other frequencies, of safety information and lists of messages on hand. Except for distress and urgency, all other communications should be carried out on a working or inter-ship frequency, leaving 2182kHz available for such calls. Safety traffic should also be transmitted on a working frequency.

Local SSB Frequencies In The Medium And High Frequency Bands (Mf/Hf)	
Supplementary calling frequency.	2045kHz 2068kHz
Inter-ship working frequency for use after communication has been established on 2182kHz or 2045kHz.	2456kHz 2638kHz 2012kHz
Harbour authority working frequency.	2162kHz
Working frequencies for exchanging messages between private coastal stations and ships after communication has been established on 2182kHz or 2045kHz.	2480kHz 2444kHz
For communication with coastal stations providing communication for aquatic sporting events. These frequencies may also be used by land stations providing communication for sporting events.	2089kHz 2129kHz
Working frequencies between coastal and ship stations, or inter-ship, after initial contact has been established on 4125kHz.	4146kHz 4417kHz
Working frequencies between coastal and ship stations, or inter-ship, after initial contact has been established on 6215kHz.	6224kHz 6227kHz
Working frequencies for exchanging messages between TAUPO Maritime Radio and ships after communication has been established on a calling frequency.	2207kHz 4146kHz 6224kHz 8297kHz 12356kHz 16531kHz

International Distress And Calling Frequencies In The Medium And High Frequency Bands (MF/HF)	
An international distress, safety and calling frequency for radiotelephony.	2182kHz
An international distress, safety and calling frequency.	4125kHz 6215kHz
International call frequency only (not monitored by MOC).	8255kHz
International distress and safety frequency only.	8291kHz
International distress, safety and calling frequencies.	12290kHz 16420kHz

Purpose Of VHF Channels	**Channel**
The international distress, safety and calling frequency for the maritime mobile VHF radiotelephone service. All ship's stations licensed for operation in the authorised bands between 156MHz and 174MHz must be able to transmit and receive on this channel.	16
Inter-ship navigation safety.	13
For inter-ship working.	6, 8
Working channel for harbour authority radio stations on port operation and ship movements.	9, 10, 11, 12, 14, 19
Continuous weather transmission channel.	20, 21, 22, 23
Two frequency talk-through repeater channels, some allocated to Coastguard and to other private coast stations.	1, 3, 4, 5, 60, 61, 62, 63, 64, 65, 66,80, 81, 82, 83, 84, 85, 86
Working channel for Great Barrier Maritime Radio.	25
Working channel for WHANGAREI, TOLAGA, WAIRARAPA, TARANAKI, D'URVILLE, FOX, PUYSEGUR, KAIKOURA and WAITAKI Maritime Radios, and anti-pollution operations.	67
Working channel for CAPE REINGA, PLENTY, NAPIER, FAREWELL, PICTON, AKAROA, GREYMOUTH and BLUFF Maritime Radios.	68
Working channel Wanganui Maritime Radio.	69
DSC distress alert and messaging	70
Working channels between coast and ship stations after initial contact has been made on channel 16. Also working channel for KAITAIA, AUCKLAND, RUNAWAY, WELLINGTON, WESTPORT, FIORDLAND, CHALMERS, CAPE EGMONT and STEWART ISLAND Maritime Radios.	71
Channel for use in association with marina developments.	73
Working channels between coast and ship stations after initial contact has been made on channel 16.	74
Channels available for aquatic events.	17, 77
Working channels for CHATHAM ISLANDS Maritime Radio.	60, 62

VHF broadcasts

The following broadcasts are made daily by Maritime Radio. These broadcasts include weather warnings, situation and forecast, and

navigational warnings. All times are in New Zealand local times and include a long range (5-day) outlook. All New Zealand coastal VHF stations transmit forecasts for all weather forecast areas simultaneously.

Taupo Maritime Radio VHF Voice Broadcasts	
Calling	Channel 16
Working	Channel 25, 67, 68, 69, 71
Times	0133, 0533, 0733, 1033*, 1333, 1733 and 2133. NZST or NZDT

Local area forecasts and current wind conditions are also broadcast continuously by Coastguard in Auckland, Northland, Whitianga, Wellington, Cook Strait and Nelson using channels 20, 21 or 23.
Chatham Island coastal VHF stations transmit weather forecasts simultaneously on working channels 60 and 62 at 0603, 1403, 1803, 2203 (all times are Chatham Islands local time +45minutes ahead of NZ local time).
* The 1033 broadcast includes all warnings in force and reports from coastal stations, but no situation or forecast.

TAUPO Maritime Radio (MF/HF)

The MF/HF (SSB) Maritime Radio Service is provided by TAUPO Maritime Radio, from a site in the middle of the North Island (38° 52'S 176° 26'E).
The calling and working frequencies are shown below. A watch is kept continuously on all calling frequencies.

Taupo Maritime Radio Voice Frequencies (in kHz)						
Calling	2182	4125	6215	8291	12290	16420
Working	2207	4146	6224	8297	12356	16531

Taupo Maritime Radio Digital Selective Calling (Dsc) Frequencies (in kHz)					
Distress	4207.5	6312.0	8414.5	12557.0	16804.5

The IMO introduced Digital Selective Calling (DSC) on MF, HF and VHF maritime radios as part of the GMDSS system. DSC is primarily intended to initiate ship-to-ship, ship-to-shore and shore-to-ship radiotelephone and MF/HF radiotelex calls. DSC calls can also be made to individual stations, groups of stations, or "all stations" in one's radio range. Each DSC-equipped ship, shore station and group is assigned a unique 9-digit Maritime Mobile Service Identity.

MF/HF broadcasts

The following broadcasts are made on MF/HF frequencies from TAUPO Maritime Radio. A preliminary call is made on the calling frequencies shown below and the broadcasts are made on the working frequencies. All times are in New Zealand local times.

Broadcast Type	Times		Frequencies kHz			
			Calling		Working	
Coastal warnings and bulletins (including Chatham Islands)	0133 1333	0533 1733	2182 4125 6215		2207 4146 6224	
Coastal reports	0803 1203 2003		2182 4125 6215		2207 4146 6224	
Oceanic warnings*	0303	1503	6215	12290	6224	12356
Oceanic warnings*	0333	1533	8291	16420	8297	16531
Oceanic weather bulletins and warnings	0903	2103	6215	12290	6224	12356
Oceanic weather bulletins and warnings	1003	2203	8291	16420	8297	16531

* For daylight saving time, add 1 hour.

Notes:

- Bulletins contain weather situation and forecast.
- Reports contain the weather situation at selected coastal sites.
- Warnings include navigational, ionospheric and meteorological warnings.

Useful Contacts:

Maritime New Zealand
PO Box 27 006, Wellington
Ph (04) 473 0111
Fax (04) 494 1263
Email
maritime.radio@maritimenz.govt.nz
Website www.maritimenz.govt.nz

Maritime New Zealand
Maritime Operations Centre
Ph 0800 MARITIME
(0800 627 484)
or (04) 914 8333
Fax (04) 914 8334
Email maritime@kordia.co.nz

INTERNATIONAL VHF MARINE CHANNELS

Channel	Ship Frequencies	
	Tx	Rx
0	156	160.6
1	156.05	160.65
2	156.1	160.7
3	156.15	160.75
4	156.2	160.8
5	156.25	160.85
6	156.3	160.9
7	156.35	160.95
8	156.4	161
9	156.45	161.05
10	156.5	161.1
11	156.55	161.15
12	156.6	161.2
13	156.65	161.25
14	156.7	161.3
15	156.75	161.35
16	156.8	161.4
17	156.85	161.45
18	156.9	161.5
19	156.95	161.55
20	157	161.6
21	157.05	161.65
22	157.1	161.7
23	157.15	161.75
24	157.2	161.8
25	157.25	161.85
26	157.3	161.9
27	157.35	161.95
28	157.4	162
60	156.025	160.625
61	156.075	160.675

Channel	Ship Frequencies	
	Tx	Rx
62	156.125	160.725
63	156.175	160.775
64	156.225	160.825
65	156.275	160.875
66	156.325	160.925
67	156.375	160.975
68	156.425	161.025
69	156.475	161.075
70	156.525	161.125
71	156.575	161.175
72	156.625	161.225
73	156.675	161.275
74	156.725	161.325
75	156.775	161.375
76	156.825	161.425
77	156.875	161.475
78	156.925	161.525
79	156.975	161.575
80	157.025	161.625
81	157.075	161.675
82	157.125	161.725
83	157.175	161.775
84	157.225	161.825
85	157.275	161.875
86	157.325	161.925
87	157.375	161.975
88	157.425	162.025
87B (AIS-1)	161.975	161.975
88B (AIS-2)	162.025	162.025

The Automatic Identification System (AIS) is an automated tracking system used on ships and by Vessel Traffic Services (VTS) for identifying and locating vessels by electronically exchanging data with other nearby ships and VTS stations. AIS information supplements marine radar, which continues to be the primary method of collision avoidance for water transport.
There is software available to track vessels in local waters such as freeais (www.freeais.org), gnuais (http://gnuais.sourceforge.net/) or Ship Plotter(http://www.coaa.co.uk/shipplotter.htm).

MARITIME RADIO VHF COVERAGE

Note: This map represents approximate location and coverage of Maritime New Zealand's VHF radio stations. From time to time gaps may exist within the areas shown due to terrain shadows and system maintenance. Terrain shadows can occur close to the shore under cliffs or in bays and fiords.

- 24hr/day listening watch is kept by all VHF stations on channel 16.
- The coverage shown above is for vessels with a 25W radio working into a correctly installed antenna mounted 4m or more above the waterline.

NEW ZEALAND RADIO SPECTRUM USAGE

Information Courtesy of Ministry of Economic Development (MED) Radio Spectrum Management Group (RSM)
Refer to http://www.rsm.govt.nz/cms/tools-and-services/publications/public-information-brochures-pibs/pib-21-table-of-radio-spectrum-usage-in-new-zealand for more information

Frequency Range	New Zealand Allocation	Summary of usage
Below 9kHz	Not Allocated	Research of VLF propagation
9-90kHz	9-90kHz Fixed Mobile	Leaky coaxial cable for communications underground e.g. Mining 30-190kHz SRD usage restricted to telemetry / telecommand
90-190kHz	Amateur Mobile	30-190kHz SRD telemetry / telecommand usage includes: car locks, alarms and immobilizers shop tag identification systems 30-190kHz SRD usage restricted to telemetry / telecommand 130-190kHz amateur usage
190-200kHz	Aeronautical Radio Navigation	Aeronautical NDBS
285-325kHz	Aeronautical Radio Navigation	Aeronautical non-directional beacons
405-415kHz	Radio Navigation	
415-495kHz	Maritime Mobile	Government maritime mobile services 457kHz avalanche beacons
521-1612kHz	Broadcasting	521-1 612kHz MF-AM sound broadcasting under MR regime (MR5) 525-1705kHz under ministerial directive
1612-1690kHz	Radio Navigation	Aeronautical non-directional beacons 525-1705kHz under ministerial directive
1690-1800kHz	Fixed Mobile	CT1 cordless telephone base transmitters generally licensed radio buoys government land & maritime mobile services 525-1705kHz under ministerial directive
1800-2000kHz	1800-1950kHz Amateur Fixed Mobile Except Aeronautical Mobile	Amateur 160m band generally licensed radio buoys government maritime mobile services dgps
1950-2000kHz	Mobile Except Aeronautical Mobile Radio Navigation Radiolocation	Radio buoys land mobile government service non-directional beacon
2000-2065kHz	Fixed Mobile	Maritime mobile land mobile
2065-2107kHz	Maritime Mobile	Maritime mobile
2107-2170kHz	Mobile	Maritime mobile-coast stations land mobile government services
2170- 2173.5kHz	Maritime Mobile	Guard band for 2182kHz
2173.5- 2190.5kHz	Mobile	2182kHz distress and calling
2190.5- 2194kHz	Maritime Mobile	Guard band for 2182kHz
2194-2300kHz	Fixed Mobile	Predominantly mobile with some fixed usage
2300-2495kHz	Fixed Mobile	Land and maritime mobile with one fixed service licence
2495-2501kHz	Standard Frequency 2.5Mhz	
2505-2850kHz	Mobile	Land, maritime and aeronautical mobile
2850-3025kHz	Aeronautical Mobile (R)	Aeronautical base and sar (3023kHz)
3025- 3155kHz	Aeronautical Mobile(OR)	Commercial and government aeronautical services
3155- 3200 kHz	Mobile Except Aeronautical Mobile (R)	Land mobile simplex and aeronautical mobile(OR)
3200- 3230kHz	Fixed Mobile Except Aeronautical Mobile (R)	Predominantly land mobile with a few fixed assignments
3400- 3500kHz	Aeronautical Mobile (R)	Aeronautical base transmitters at Auckland airport
3500- 3900kHz	Amateur Mobile	80m amateur band
3900- 3950kHz	Aeronautical Mobile Broadcasting	Land and aeronautical mobile in the lower South Island broadcasting service for the print disabled located in Levin (3935kHz)
3950- 4000kHz	Fixed	Government fixed services
4000- 4063kHz	Fixed Maritime Mobile	Government fixed and maritime mobile services GMDSS / distress and safety calling training licenses
4063- 4438kHz	Maritime Mobile	Private and public coast stations
4438- 4650kHz	Fixed Mobile	Heavily used for fixed and mobile use including maritime mobile. Range of "all New Zealand" fixed services. Fixed service to South Pacific and sub-Antarctic islands. Maritime mobile service to similar areas. Extensive land mobile service to remote locations.
4650- 4700kHz	Aeronautical Mobile (R)	Flight operations based in Auckland
4700- 4750kHz	Aeronautical Mobile(OR)	Government services. Aeronautical communications in remote locations. Planned for use at scott base.
4750- 4850kHz	Fixed Land Mobile	Predominantly government services, lightly used for fixed and mobile use
4850- 4995kHz	Land Mobile	Land mobile simplex services (a few based at coast stations, one at a remote aeronautical base)
4995- 5003kHz	Standard Frequency 5 Mhz	
5005- 5060kHz	Fixed	Government fixed service
5060- 5250kHz	Fixed Land Mobile	Fixed services to South Pacific and sub-Antarctic islands. Minor land mobile use.
5250- 5450kHz	Land Mobile	Land mobile and communications to aeronautical mobile(OR) (helicopters) operating in conjunction with land mobile services. Extensive government and civil defence use.

5450- 5480kHz	Aeronautical Mobile(OR) Land Mobile	Land mobile service operating in conjunction with aeronautical mobile service
5480- 5680kHz	Aeronautical Mobile (R)	Flight operations based in Auckland, Christchurch, Invercargill, Queenstown and Milford
5680- 5730kHz	Aeronautical Mobile(OR)	Off-route communications especially remote areas, with common sar frequency of 5681.4kHz.
5730- 5900kHz	Mobile Except Aeronautical Mobile (R)	Mainly government mobile services with limited land mobile and meteorological broadcasting from Auckland
5900- 5950kHz	Fixed	Government fixed services
5950- 6200kHz	Broadcasting	Radio New Zealand international 6100kHz
6200- 6525kHz	Maritime Mobile	Extensive maritime mobile usage for ship and coast stations
6525- 6685kHz	Aeronautical Mobile (R)	Flight operations based in Auckland
6685- 6765kHz	Aeronautical Mobile(OR)	Government aeronautical operations with portable stations on 6745.5kHz
6765- 7000kHz	Fixed Mobile	6765- 6795kHz industry, scientific, and medical and short range device telemetry and telecommand usage
6795- 7000kHz		Government fixed usage with search and rescue operations on 6911.4kHz. One maritime mobile use.
7000- 7100kHz	Amateur Amateur-Satellite	Amateur 40m band
7100- 7200kHz	Amateur	Amateur
7200- 7300kHz	Broadcasting Amateur	Radio for the print disabled 7290kHz
7300- 7400kHz	Fixed Land Mobile	Government fixed services
7450- 8100kHz	Fixed Land Mobile	Fixed and mobile service for both national and international coverage within the South Pacific and sub-Antarctic islands. Mainly government services including civil defence.
8100- 8195kHz	Fixed Maritime Mobile	
8195- 8815kHz	Maritime Mobile	Extensive use for ship-shore communications
8815- 8965kHz	Aeronautical Mobile (R)	Flight operations based in Auckland
8965- 9040kHz	Aeronautical Mobile(OR)	Mainly government services and flight operations
9040- 9400kHz	Fixed	Government fixed services for national and international coverage within the South Pacific and sub-Antarctic islands.
9400- 9500kHz	Broadcasting Fixed	31m band radio New Zealand international on 9655kHz and 9700kHz limited government fixed services
9900- 9995kHz	Fixed	Fixed service for both national and international coverage within the South Pacific and sub-Antarctic islands. Mainly government services including department of conservation.
9995- 10003kHz	Standard Frequency 10Mhz	
10.005- 10.100MHz	Aeronautical Mobile (R)	Flight operations in Auckland
10.100- 10.150MHz	Amateur	Amateur 30m band
10.150- 11.175MHz	Fixed	Fixed service for both national and international coverage within the South Pacific and sub-Antarctic islands. Mainly government services.
11.175- 11.275MHz	Aeronautical Mobile(OR)	Mainly government services, with some rural and helicopter off-route usage.
11.275- 11.400MHz	Aeronautical Mobile (R)	Flight operations based in Auckland
11.400- 11.600MHz	Fixed	Government fixed services for international coverage.
11.600- 11.650MHz	Fixed	Fixed service for both national and international coverage within the South Pacific and sub-Antarctic islands. Mainly government services
11.650- 12.050MHz	Broadcasting	25m band radio New Zealand international on 11.735MHz and 11.90MHz
12.050- 12.100MHz	Fixed	Fixed service for both national and international coverage within the South Pacific and sub-Antarctic islands. Mainly government services
12.100- 12.230MHz	Fixed	Fixed service for both national and international coverage within the South Pacific and sub-Antarctic islands. Mainly government services
12.230- 13.200MHz	Maritime Mobile	Maritime mobile ship to shore communications
13.200- 13.260MHz	Aeronautical Mobile(OR)	Off route flight operations in Auckland and Taupo including communications to rescue helicopters
13.260- 13.360MHz	Aeronautical Mobile (R)	Flight operations in Auckland
13.360- 13.410MHz	Fixed	Fixed service for both national and international coverage within the South Pacific and sub-Antarctic islands. Mainly government services including the meteorological and department of conservation communications.
13.410- 13.570MHz	Fixed Mobile	13.550- 13.570MHz industry, scientific, and medical & short range device telemetry and telecommand usage
13.570- 13.600MHz	Fixed	Meteorological communications to Raoul Island
13.870- 14.000MHz	Fixed	International government fixed service communications to Antarctic bases.
14.000- 14.250MHz	Amateur Amateur-Satellite	Amateur 20m band
14.250- 14.350MHz	Amateur	
14.350- 14.990MHz	Fixed	Fixed service for both national and international coverage within the Pacific and sub-Antarctic islands. Mainly government services including the meteorological communications.
14.990- 15.005MHz	Standard Frequency 15Mhz	
15.010- 15.100MHz	Aeronautical Mobile(OR)	Off route flight operations in Auckland and Taupo. Government off-route aeronautical use.

15.100- 15.600MHz	Broadcasting	Radio New Zealand International on 15.115MHz
15.600- 15.800MHz	Fixed	Fixed service for both national and international coverage within the Pacific and sub-Antarctic islands. Mainly government services including meteorological communications.
15.800- 16.360MHz	Fixed	Fixed service for both national and international coverage within the Pacific and sub-Antarctic islands. Mainly government services including department of conservation and meteorological communications.
16.360- 17.410MHz	Maritime Mobile	Extensive private and public coast station usage throughout New Zealand.
17.410- 17.480MHz	Fixed	Government fixed service international coverage to Pacific islands.
17.480- 17.550MHz	Fixed	Government fixed service for both national and international coverage within the Pacific and sub-Antarctic islands.
17.550- 17.900MHz	Broadcasting Fixed	Government fixed service assignments for Trans-Tasman sea communications
17.900- 17.970MHz	Aeronautical Mobile (R)	Flight operations in Auckland
17.970- 18.030MHz	Aeronautical Mobile(OR)	Off route flight operation communications to the South Pacific and around Auckland and Taupo
18.030- 18.052MHz	Fixed	Government fixed service assignments for Trans-Tasman sea communications
18.052- 18.068MHz	Fixed	
18.068- 18.168MHz	Amateur	Amateur 17m band
18.168- 18.780MHz	Fixed	Government fixed service for both national and international coverage within the Pacific and sub-Antarctic islands.
18.780- 18.900MHz	Maritime Mobile	Maritime simplex radiotelephone to ships in the South Pacific.
18.900- 19.020MHz	Broadcasting	
19.020- 19.680MHz	Fixed	Government fixed service assignments for Trans-Tasman sea and South Pacific communications
19.680- 19.800MHz	Maritime Mobile	Maritime duplex radiotelephone to ships in the South Pacific.
19.800- 19.990MHz	Fixed	Government fixed service assignments for national communications
19.990- 19.995MHz	Standard Frequency 20 Mhz	
20.010- 21.000MHz	Fixed	Government fixed service for both national and international coverage within the Pacific and sub-Antarctic islands. One commercial circuit to scott base (Antarctica).
21.000- 21.450MHz	Amateur	Amateur 15m band
21.450- 21.850MHz	Broadcasting Fixed	Government fixed service for international coverage
21.850- 21.870MHz	Fixed	Government fixed service assignments for national communications
21.870- 21.924MHz	Fixed	Government fixed service for international coverage
21.924- 22.000MHz	Aeronautical Mobile (R)	Flight operations in Auckland
22.000- 22.855MHz	Maritime Mobile	Ship and shore communications
22.855- 23.000MHz	Fixed	Government fixed service for both national and international coverage within the Pacific and sub-Antarctic islands. One commercial circuit to Pitcairn Island.
23.200- 23.350MHz	Aeronautical Mobile(OR)	Government aeronautical(OR) services for national communications, and international communications within the South Pacific.
23.350- 24.000MHz	Fixed	Government fixed service for both national and international coverage within the Pacific and sub-Antarctic islands.
24.890- 24.990MHz	Amateur Amateur-Satellite	Amateur 12m band
24.990- 25.005MHz	Standard Frequency 25 Mhz	
25.010- 25.070MHz	Fixed Mobile	Government fixed service for national coverage
25.070- 25.210MHz	Maritime Mobile	Government maritime service for national communications and international communications within the South Pacific
25.210- 25.550MHz	Fixed Mobile	Government services for national communications.
25.550- 25.670MHz	Fixed	Government fixed services for national communications
25.670- 26.100MHz	Broadcasting	11m band
26.100- 26.175MHz	Maritime Mobile	
26.175- 27.500MHz	Fixed Mobile Except Aeronautical Mobile	26.175- 26.3MHz meteorological (auroral radar) at Birdlings Flat and government fixed services for national communications
26.32- 26.78MHz		Citizen band "CB" radio service
26.78- 26.95MHz		Government fixed service for national coverage
26.95- 27.3MHz		Local area paging services ISM usage SRD unrestricted usage 27.12MHz amateur
27.3- 27.5MHz		Government fixed services for national and international communications
27.500- 28.000MHz	Fixed Mobile	Government fixed and mobile services to for national and international communications within the South Pacific wavebuoy telemetry at Mokohinau
28.000- 29.700MHz	Amateur Amateur-Satellite	Amateur 10m band
29.700- 30.005MHz	Fixed Mobile	29.7-30.0 short range device unrestricted usage 29.775-29.785 government 29.8-30.00 telemetry device usage
30.01 - 37.5MHz	Fixed Mobile	30.4-37.5MHz government services for national and international communications within the South Pacific and sub-Antarctic islands 30.05-30.8MHz cordless telephone "CT1 band" base transmit 30.8-32MHz short range device model control/model aircraft control usage 31.3-31.6 radio paging usage 33.40MHz television sound intermediate frequency 35-35.5MHz short range device model aircraft control usage 35.5-37.2MHz short range device unrestricted and telemetry device usage

37.5 - 38.25MHz	Fixed Mobile	38 - 39.986MHz government services for national and international communications within the South Pacific and sub-Antarctic islands 38.90MHztelevision vision intermediate frequency 39.2MHz telemetry device usage 39-39.7MHz short range device usage 39.7-40.5MHz cordless telephone "CT1 band" mobile transmit
39.986 - 40.02MHz	Fixed Mobile	
40.020 - 40.980MHz		40.02 - 40.98MHz government services for national and international communications 40.68MHz radio paging 40.5 - 40.66MHz short range device model aircraft control usage 40.66 - 40.7MHz short range device unrestricted usage 40.7 - 40.8MHz short range device model aircraft control usage 40.8 - 41MHz short range device unrestricted usage
40.98 - 41.015		40.8-41MHz short range device unrestricted usage 40.98-44MHz government services for national and international communications auroral radar at birdlings flat general user radio licence for short range devices general user radio licence for cordless telephones
44 - 47MHz	Broadcasting	44-51MHz VHF television broadcasting under MR regime (MR7) radio spectrum auctions
47 - 50MHz	Broadcasting	44-51MHz VHF television broadcasting under MR regime (MR7)
50 - 54MHz	50-51 Mhz Fixed Mobile Broadcasting Amateur	
54 - 68MHz	Fixed Mobile Broadcasting	VHF television broadcasting under MR regime (MR8)
68 - 74.8MHz	Fixed Mobile	72 - 72.25MHz short range device auditory aids 72.25 - 72.5MHz short range device unrestricted usage 72-73MHz CT1 cordless telephones
74.8 - 75.2MHz	Aeronautical Radio Navigation	Aeronautical marker beacons ILS locator beacons
75.2 - 75.4MHz	Mobile	75.2 - 76.3MHz land mobile "ESA" band (emergency services base transmit)
75.4 - 87MHz	76.3-78.1 Mhz Not Allocated	
78.1-79.2MHz		Land mobile "ESA" band (emergency services) mobile transmit
81 - 88MHz	Mobile	Land mobile "A" band including some government services
88-88.8MHz		Radio public address systems 88.0-88.8MHz low power FM bc use 88-108MHz under ministerial directive
88.8-106.63MHz		VHF-FM sound broadcasting (Band II) under MR regime (MR43) 88-108MHz under ministerial directive
100-106.63MHz	Broadcasting	Extension to FM sound broadcasting band under MR regime
106.63 - 108MHz	Broadcasting	Low power FM BC use 107-108MHz short range devices 88-108MHz under ministerial directive
108 - 117.975MHz	Aeronautical Radio Navigation	108-112MHz ILS localisers at some airports
112 - 117.975MHz		VOR aeronautical beacons
117.975 - 137MHz	Aeronautical Mobile (R)	117.975-137MHz widespread aeronautical use 121.5MHz search and rescue service: COSPAS-SARSAT EPIRB transmissions 123.1MHz low power search and rescue transceivers 132-132.6MHz aeronautical repeaters base transmit 135.4-136MHz aeronautical repeaters base receive 136-137MHz government aeronautical use
137 - 137.025MHz	Mobile-Satellite (Space-To-Earth) Meteorological - Satellite (Space-To-Earth) Fixed Mobile	137-138MHz government service usage
138 - 143.6MHz	Mobile	138-144MHz land mobile "ESB Band" heavily utilised for emergency services predominantly New Zealand ambulance and civil defence groups 138.0-140.5MHz mobile transmit 140.5-141MHz simplex 141. -143.5MHz base transmit 143.5-144MHz simplex
144 - 146MHz	Amateur Amateur Satellite	144-148MHz amateur 2m band widespread use of both simplex and repeater services limited government service usage
146 - 148MHz	Amateur	
148.000 - 149.900MHz	Mobile Mobile-Satellite (Earth-To-Space)	Civil defence and emergency service use throughout New Zealand, migrating to other bands by 2004
149.900 - 150.050MHz	Radio Navigation - Satellite Mobile-Satellite (Earth-To-Space)	
150.050 - 156.7625MHz	Mobile	150.050 - 156MHz land mobile "EN" band extensive nationwide use
156-157.6MHz	Maritime Mobile	Maritime mobile VHF band
156.7625 - 156.8375MHz	Maritime Mobile (Distress And Calling)	
157.6-162.2MHz	Mobile	157.6 - 157.8MHz mobile radio reporter"RR" band 157.6 - 158.07MHz wide-area paging band 158.07 - 160.1MHz land mobile "MS" special services band 158.0750 - 158.575MHz mobile transmit 158.6 - 160.1MHz simplex services including bush winch operations 160.1 - 160.6MHz short range device unrestricted usage 160.1 - 160.3MHz telemetry and telecommand 160.3 - 160.6MHz radio paging 160.6 - 160.970MHz maritime mobile VHF band 160.970 - 161.490MHz land mobile "MS" special services band 161.490 - 162.2MHz maritime mobile VHF band

162.2-174MHz	Mobile	162.2 - 162.46MHz fixed"EE" band 162.56 - 165.33MHz land mobile"EE" band 165.45 - 165.7MHz fixed"EE" band 166.32 - 166.6MHz wide- area paging "WP" band 166.8 0 - 167.0MHz fixed"EE" band 167.18 - 169.93MHz land mobile"EE" band 170.05 - 170.3MHz fixed"EE" band 170.3 - 173.0MHz mobile simplex special services including bush winch operations 173 - 174MHz short range devices with some fixed and land mobile simplex use
174 - 223MHz	Broadcasting	174 - 230MHz under MR regime (MR49) VHF television (Band III) radio microphones
230 - 235MHz	Fixed Mobile Aeronautical Radio Navigation	230-300MHz extensive government service usage.
235 - 267MHz	Fixed Mobile	230-300MHz extensive government service usage. 235-300MHz short range device telemetry and telecommand usage 243MHz search and rescue service
267 - 272MHz	Fixed Mobile	
272 - 273MHz	Fixed Mobile	
273 - 312MHz	Fixed Mobile	273-300MHz extensive government service usage 300-322MHz short range device telemetry and telecommand
273- 312MHz	Fixed Mobile	273- 300MHz extensive government service usage 300- 322MHz SRD telemetry and telecommand 305- 328.6MHz extensive government service usage
328.6- 335.4MHz	Aeronautical Radio Navigation	Aeronautical ILS glidepath transmitters at airports
335.4- 387MHz	Fixed Mobile	335.4- 399.9MHz extensive government usage
399.9- 400.05MHz	Radio Navigation Satellite	
400.05- 400.15MHz	Standard Frequency And Time Signal- Satellite	
400.15- 401MHz	Meteorological Aids Meteorological- Satellite (Space- To- Earth)	Meteorological radio- sondes at Invercargill and Paraparaumu airports
401- 402MHz	Meteorological Aids Earth Exploration- Satellite (Earth- To- Space) Meteorological- Satellite (Earth- To- Space) Fixed Land Mobile	Meteorological aids nationwide land mobile usage is restricted to medical telemetry
403- 406MHz	Meteorological Aids Fixed Mobile	Meteorological aids nationwide land mobile usage is restricted to medical telemetry some government fixed and mobile service usage
406- 406.1MHz	Mobile- Satellite (Earth- To- Space)	Limited to the operation of EPIRBS
406.1- 410MHz	Fixed Mobile	Analog land mobile trunked dispatch "TD" band mobile transmit 406.1- 410MHz
410- 420MHz		Planned to become td mobile transmit 410- 412MHz
412- 414MHz		Planned for TD simplex and simplex fixed services
418- 420MHz		Planned to become TD base transmit
420- 430MHz	Fixed Mobile Except Aeronautical Mobile	420- 425MHz fixed "I" band alpha transmit 425 - 430MHz fixed "I" band beta transmit
430- 432MHz	Radiolocation Amateur Amateur Satellite	Amateur 70m band used throughout New Zealand
432- 438MHz		433.05- 434.79MHz SRD telemetry and telecommand 435- 438MHz amateur satellite
440- 450MHz	Fixed Mobile Except Aeronautical Mobile Radiolocation	440- 449MHz fixed"JL" band, providing migration spectrum for I band links. STLS accommodated in 444- 445MHz 444- 445MHz SRD biomedical telemetry usage
449.750- 450MHz		Land mobile "CNX" band simplex
450- 455MHz	Fixed	450- 450.275MHz fixed "JC" band (11 x 25kHz single frequency channels)
	Mobile	450.275- 453.3:MHz land mobile"C" band, mobile transmit 453.3- 453.625:MHz land mobile "CNX" band simplex
	Fixed	453.625- 454.975MHz fixed "JB" band alpha transmit (53 x 25kHz two frequency channels interleaved with 108 x 12.5kHz two frequency channels).
	Mobile	454.975- 455.31225:MHz land mobile"C" band simplex 455.312255- 458.3375:MHz land mobile"C" band base transmit
		458.3375- 458.5375MHz land mobile "D" band simplex
	Mobile	458.5375- 458.6125MHz radio paging, and SRD unrestricted usage
		458.6125- 458.6625MHz land mobile "D" band simplex
	Fixed	458.6625- 460.0125MHz fixed "JB" and "JNB" band beta transmit (53 x 25kHz two frequency channels interleaved with 108 x 12.5kHz two frequency channels). 460.025- 461.425MHz fixed "jd" band alpha transmit (28 x 50kHz channels) 461.425- 461.475MHz fixed "je" band (1 x 50kHz single frequency channel)
	Mobile	461.475- 461.8125MHz land mobile "DNX" band simplex channels 21- 47 461.8125- 464.8125MHz land mobile "dn" band base transmit 464.8125- 465.1875MHz land mobile "DNX" band simplex channels 48- 77
	Fixed	465.1875- 465.2375MHz fixed "JF" band (1 x 50kHz single frequency channel) 465.2375- 466.6375MHz fixed "JD" band beta transmit (28 x 50kHz channels)
	Mobile	466.675- 466.8MHz land mobile "DNX" band simplex channels 78- 87
		466.8- 466.850MHz SRDS and telemetry and telecommand (biomedical telemetry only)

		466.85- 467.0MHz land mobile "DNX" band simplex channels 88- 99 467.0- 470.0MHz "DN" band mobile transmit
470- 585MHz	Mobile	470- 470.5MHz SRD usage (biomedical telemetry only)
	Mobile	470.5- 471MHz land mobile "FNX" band simplex (12.5kHz channels 101- 140)
		471.0- 471.5MHz SRD and telemetry and telecommand usage
		471.5- 472.0MHz land mobile "FNX" band simplex (12.5kHz channels 201- 240, 472.0- 476.0MHz land mobile "FN" band mobile transmit channels 1- 320 476.0- 476.4MHz land mobile "FNX" band simplex (12.5kHz channels 301- 332
		476.400- 477.425MHz personal radio service "PRS" band
		477.425- 477.9875MHz land mobile "FNX" band simplex (12.5kHz channels 501- 660) 477.9875- 481.9875:MHz land mobile "FN" band base transmit channels 1- 320 481.9875- 483.9875MHz land mobile "FNX" band simplex (12.5kHz channels 501- 600) 483.9875- 487.9875MHz land mobile "FN" band base transmit channels 321- 640 487.9875- 490.0MHz land mobile "FNX" band simplex (12.5kHz channels 701- 861) 490.0- 494.0MHz land mobile "FN" band mobile transmit channels 321- 640
		494- 502MHz under ministerial directive
	502- 806 Mhz Broadcasting	Uhf television (band iv) 502- 518MHz: block 0
		Uhf television (band iv) 28 x 8MHz channels in 7 blocks under the management right regime 518- 550MHz: block 1 550- 582MHz: block 2 MR1
		Uhf television (band v) 582- 614MHz: block 3 m©ri television service MR195
610- 890MHz		614- 646MHz: block 4 (government reserved) SRDS, audio/video senders in particular and amateur use under ministerial directive
		Uhf television (band v) 646- 678MHz: block 5 678- 710MHz: block 6 710- 742MHz: block 7 742- 774MHz: block 8 774- 806MHz: block 9 radio microphones
	Fixed	806- 812MHz fixed "KK" band alpha transmit (11 x 500kHz channelling)
	Mobile	812- 813MHz land mobile "ESD" band (emergency services) mobile transmit 813- 814MHz land mobile expanded ts bands (trunked dispatch) mobile transmit 814- 819MHz land mobile "TS" band (trunked dispatch) mobile transmit 819- 824MHz SRD and spread spectrum device usage 824- 825.015MHz amps extension band
	Mobile	825.015- 845MHz amps / damps cellular band (private management rights)
		845- 849MHz alternative pairing with 890- 894MHz for cellular telephony
	Fixed	849- 851MHz studio to transmitter linking
	Fixed Mobile	851- 857MHz fixed "KK" band beta transmit (11 x 500kHz channelling)
		857- 858MHz land mobile "ESD" band (emergency services base transmit
		858- 859MHz land mobile expanded ts bands (trunked dispatch) base transmit 859- 864MHz land mobile "TS" band (trunked dispatch) base transmit 862- 870MHz possible SRD GURL band
		864- 868.1MHz cordless telephone "CT2" band 864- 868MHz spread spectrum devices 862- 870MHz possible SRD GURL band
		868.1- 869.025MHz land mobile "TX" band simplex operation 862- 870MHz possible SRD GURL band
		869.025- 870.015MHz amps extension band
	Fixed Mobile	870.015- 890MHz amps / damps cellular band (private management rights)
890- 942MHz	Fixed Mobile	890- 915MHz GSM cellular band (private management rights- mobile transmit)
		915- 921MHz fixed "K" band- studio transmitter links 915- 921MHz SRD telemetry and telecommand usage (3mw)
		921- 929MHz ISM, SRD, and amateur usage 922- 927MHz
		929- 935MHz "K" band - studio- transmitter links
	Fixed Mobile	935- 960MHz GSM cellular band private management rights- base transmit
960- 1164MHz	Aeronautical Radio Navigation	Aeronautical radio navigation (distance measuring equipment and secondary surveillance radar)
1215- 1240MHz	Radiolocation Radio Navigation- Satellite	Radiolocation radio navigation
1240- 1300MHz	Radiolocation Radio Navigation- Satellite Amateur	1240- 1300MHz radiolocation amateur
1300- 1350MHz	Aeronautical Radio Navigation Radiolocation	Radiolocation and radio navigation - primary surveillance radar at major airports
1350- 1400MHz	Radiolocation	
1400- 1427MHz	Radio Astronomy Space Research (Passive)	Astronomy and space research all emissions prohibited
1427- 1429MHz	Fixed	1427- 1429.5MHz fixed "ll" band for narrow band high efficiency digital fixed links, alpha transmit 1429- 1461.5MHz fixed "l" band point to point linking alpha transmit
	Fixed Broadcasting Broadcasting Satellite (Sound)	1461.5- 1490MHz digital audio broadcasting (DAB) 1461.5- 1490MHz under ministerial directive 1490- 1492MHz fixed "l" band beta transmit
1492- 1518MHz	Fixed	1492- 1522MHz fixed "l" band beta transmit 1522- 1525MHz fixed "ll" band for narrow band high efficiency digital fixed links , beta transmit
1525- 1530MHz	Mobile- Satellite (Space- To- Earth)	1525- 1559MHz mobile satellite (space- to- earth) - Immarsat downlinks paired with 1626.5- 1660.5MHz

1559- 1610MHz	Radio Navigation- Satellite (Space- To- Earth)	1559- 1610MHz radio navigation satellite (space- to- earth) global positioning system (GPS)
1610- 1610.6MHz	Mobile Satellite (Earth- To- Space)	1610- 1626.5MHz mobile- satellite (earth- to- space) paired with 2483.5MHz
1626.5- 1660MHz	Mobile- Satellite (Earth- To- Space)	1626.5- 1660MHz mobile satellite (earth- to- space) - Immarsat uplinks paired with 1525- 1559MHz
1660- 1660.5MHz	Radio Astronomy	
1660.5- 1668MHz	Radio Astronomy Space Research (Passive) Meteorological Aids	
1670- 1675MHz	Meteorological Aids Fixed Meteorological- Satellite (Space- To- Earth) Mobile	Meteorological satellite downlinks
1675- 1690MHz	Meteorological- Satellite (Space- To- Earth)	1675- 1710MHz meteorological - satellite downlinks
1710- 1930MHz	Fixed Mobile	1710- 1880MHz private management rights - suitable for 2nd and 3rd generation cellular technologies and fixed services.
		1880- 1900MHz generally licensed dect systems 1895- 1920MHz generally licensed PHS service
		1920- 1980MHz private management rights - suitable for 2nd and 3rd generation cellular technologies and fixed services.
1980- 2010MHz	Fixed Mobile Mobile- Satellite (Earth- To- Space)	1980- 2010MHz fixed point to point links and possible future mobile satellite uplinks.
2010- 2025MHz	Fixed Mobile	2010- 2025MHz private management rights - suitable for tdd, 3G cellular technologies and fixed services.
2025- 2110MHz		2025- 2110MHz private management right suitable for fwa and fixed services
2110- 2120MHz		2110- 2170MHz private management rights suitable for 2nd and 3rd generation cellular technologies
2170- 2200MHz	Fixed Mobile Mobile- Satellite (Space- To- Earth)	2170- 2200MHz fixed point to point links and possible future mobile satellite downlinks.
2200- 2290MHz	Fixed Mobile	2200- 2300MHz private management rights- suitable for FWA and fixed services.
2300- 2450MHz	Fixed Mobile Amateur	2300- 2396MHz 12 x 8MHz private management rights suitable for mmds, FWA or fixed services
		2396- 2400MHz amateur usage
		2400- 2450MHz ISM band, SRDS, amateur and some extensive broadband linking using spread spectrum technologies e.g. Wifi, wireless lans
2450- 2483.5MHz	Fixed Mobile	2450- 2483.5MHz ISM band, SRDS and extensive broadband fixed linking using spread spectrum technologies. This band identified for bluetooth and RLAN technologies. LSM usage includes microwave oven operation
2483.5- 2500MHz	Fixed Mobile Mobile- Satellite (Space- To- Earth)	ISM band mobile- satellite (space- to- earth) paired with 1610MHz
2500- 2520MHz	Fixed	2500- 2690MHz "O" band itinerant fixed linking for television outside broadcast operations spectrum identified for possible expansion of 3rd generation cellular services.
2690- 2700MHz	Radio Astronomy Space Research	Astronomy space research
2700- 2900MHz	Aeronautical Radio Navigation Radiolocation Fixed Under	Aeronautical navigation radiolocation (including radar) 2700- 2900 fixed "OX" band itinerant fixed linking for television outside broadcast operations
2900- 3100MHz	Radio Navigation Radiolocation	Radiolocation (including radar) 2900- 3400MHz SRDS
2900- 3100MHz (continued)	Radio Navigation Radiolocation	Radiolocation (including radar) 2900- 3400MHz spread spectrum devices
3100- 3300MHz	Radiolocation	
3300- 3400MHz	Radiolocation Amateur	Radiolocation amateur 2900- 3400MHz short range device radiolocation usage
3400- 3500MHz	3400- 3410 Mhz Radiolocation Amateur Amateur Satellite	Amateur
	3410- 3500 Mhz Fixed Radiolocation	3410- 3487MHz under management right (the # signifies an integer identification number) MR regime crown and private management right (the # signifies an integer identification number) MRS
3500- 3700MHz	3500- 3589 Mhz Fixed Radiolocation	3510- 3587MHz under management right (the # signifies an integer identification number) regime crown and private management rights (the # signifies an integer identification number)
	3589- 3700 Mhz Fixed Fixed- Satellite (Space- To- Earth)	
		3600- 4200MHz fixed"P" band- usage must be co- ordinated with"C" band satellite services.
3700- 4200MHz	Fixed Fixed- Satellite (Space- To- Earth)	

4200- 4400MHz	Aeronautical Radio Navigation	Radio altimeters and associated ground transponders.
4400- 4500MHz	Fixed	4400- 5000MHz fixed "PC" band planned fixed satellite service (space- to- earth) as per international radio regulations appendix 30b
5030- 5150MHz	Radiolocation Radio Navigation	Radiolocation, radio navigation - possible future use for microwave landing system (microwave landing system)
5150- 5250MHz	Aeronautical Radio Navigation Mobile Except Aeronautical Mobile	5150- 5350MHz short range device usage, rlan in particular usage of 5150- 5250MHz restricted to indoor wireless lans.
5255- 5350MHz	Mobile Except Aeronautical Mobile	Wireless lan
5350- 5460MHz	Aeronautical Radio Navigation	Restricted to airborne radar and associated beacons
5470- 5570MHz	Maritime Radio Navigation Radiolocation	Ground based meteorological radar with co- primary status 5470- 5725MHz short range device radiolocation
5570- 5650MHz	Radiolocation	5470- 5725MHz short range device radiolocation
5650- 5725MHz	Radiolocation Amateur	5650- 5725MHz radiolocation 5725- 5830MHz amateur radio beacons 5725- 5875MHz short range device and ISM usage 5725- 5825MHz short range device (fixed radio links)
5725- 5830MHz	Amateur	
5830- 5850MHz	Radiolocation Amateur Amateur Satellite (Space- To- Earth)	
5850- 5925MHz	Fixed	
		5875- 5925MHz no published channel plan.
5925- 6700MHz	Fixed Fixed- Satellite (Earth- To- Space)	5925- 6420MHz fixed "R" band 5925- 6700MHz fixed satellite service"C" band uplinks (Immarsat) 6420- 7100MHz fixed "T" band 6725- 7025MHz planned fixed satellite service allocation as per international radio regulations appendix 30b
7075- 7145MHz	Fixed	7100- 7425MHz fixed "V" band utilised for point to point linking and itinerant tv outside broadcasting.
		7425- 7730MHz fixed "U" band for point to point linking
	Fixed	7730- 8290MHz fixed "W" band for point to point linking
8215- 8400MHz		
	Fixed	8290- 8500MHz fixed "Y" band utilised for point to point linking
8500- 8550MHz	Radiolocation	
8750- 8850MHz	Radiolocation Aeronautical Radio Navigation	
8850- 9000MHz	Radiolocation Maritime Radio Navigation	
9000- 9200MHz	Aeronautical Radio Navigation	
9200- 9300MHz	Radiolocation Maritime Radio Navigation	Maritime radio navigation limited to shore based radar
9300- 9500MHz	Radio Navigation Radiolocation	Some government usage meteorological radar shore based harbour control radar
9500- 9800MHz	Radiolocation Radio Navigation	
9800- 10000MHz	Radiolocation	
10- 10.45GHz	Radiolocation Amateur	10.00- 10.50GHz radiolocation amateur
10.5- 10.55GHz	Fixed	Fixed "H" band used for point to point linking
10.68- 10.7GHz	Radio Astronomy Space Research (Passive)	Space research (passive)
10.7- 11.7GHz	Fixed	Fixed "Z" band used for point to point linking
11.7- 12.2GHz	Broadcasting Satellite	Possible planning to utilise international radio regulations appendix 30 bss assignments 11.7- 12.2GHz under ministerial directive
12.2- 12.5GHz	Broadcasting (Including Datacasting) Fixed Satellite (Space- To- Earth)	12.2- 12.375GHz fixed satellite (VSAT and DTH), subject to datacasting operations at some locations.
	Fixed Satellite (Space- To- Earth)	12.375- 12.5GHz fixed satellite (VSAT and DTH)
12.5- 12.75GHz	Broadcasting Satellite Fixed- Satellite (Space- To- Earth)	Television service delivery via satellite
12.75- 13.25GHz	Fixed	Fixed "X" band point to point linking including inter- cell site linking
13.25- 13.4GHz	Earth Exploration- Satellite (Active) Aeronautical Radio Navigation Space Research (Active)	Aeronautical radio navigation
13.4- 13.75GHz	Earth Exploration- Satellite (Active) Radiolocation Space Research	Government radiolocation usage

13.75- 14GHz	Fixed Satellite (Earth- To- Space)	
14- 14.25GHz	Fixed- Satellite (Earth- To- Space)	Satellite uplinks supporting fixed satellite service DTH and TV service via satellite delivery in 12.2- 12.75GHz
14.5- 14.8GHz	Fixed	Fixed "G" band for point to point linking
15.35- 15.4GHz	Radio Astronomy Space Research (Passive)	
15.4- 15.43GHz	Aeronautical Radio Navigation	
15.43- 15.63GHz	Fixed- Satellite (Space- To- Earth) (Earth- To- Space Aeronautical Radio Navigation	
15.63- 15.7GHz	Aeronautical Radio Navigation	
15.7- 16.6GHz	Radiolocation	15.70- 17.30GHz short range device radiolocation usage
16.6- 17.1GHz	Radiolocation Space Research (Deep Space) (Earth- To- Space)	
17.1- 17.2GHz	Radiolocation	
17.2- 17.3GHz	Earth Exploration- Satellite (Active) Radiolocation Space Research (Active)	
17.3- 17.7GHz	Fixed- Satellite (Earth- To- Space) Radiolocation	
17.7- 18.1GHz	Fixed	17.7- 19.7GHz fixed "18g" band used for point to point linking, especially for inter cell site linking
18.6- 18.8GHz	Fixed	Fixed "18g" band used for point to point linking especially for inter cell site linking
18.8- 19.3GHz	Fixed Fixed- Satellite (Space- To- Earth)	
19.3- 19.7GHz	Fixed	
19.7- 20.1GHz	Fixed- Satellite (Space- To- Earth)	Mobile- satellite (space- to- earth)
21.2- 21.4GHz	Fixed	21.2- 23.6GHz fixed "23g" band used for point to point linking
22.5- 22.55GHz	Fixed	21.2- 23.6GHz fixed "23g" band used for point to point linking
23.6- 24GHz	Radio Astronomy Space Research (Passive)	
24- 24.05GHz	Amateur Amateur- Satellite	Amateur usage short range device> SRD, spread spectrum devices and ISM usage
24.05- 24.25GHz	Radiolocation Amateur	Amateur usage (including beacons) 24.0- 24.25GHz short range device unrestricted usage and industry, scientific, and medical usage
24.25- 24.45GHz	Radio Navigation Fixed Mobile	
24.45- 24.65GHz	Fixed Mobile Radio Navigation	24.549- 25.392GHz private management rights suitable for LMDS and fixed services
24.65- 24.75GHz	Fixed Mobile	
24.75- 25.25GHz	Fixed Mobile	
25.25- 25.5GHz	Fixed Mobile	
25.5- 27GHz	Earth Exploration- Satellite (Space- To Earth) Fixed Inter- Satellite Mobile Standard Frequency And Time Signal- Satellite (Earth- To- Space)	25.555- 28.35GHz 6 private management rights suitable for LMDS and fixed services
27- 27.5GHz	Fixed Fixed- Satellite (Earth- To- Space) Inter- Satellite Mobile	
27.5- 28.5GHz	Fixed Fixed- Satellite (Earth- To- Space) Mobile	
28.5- 29.1GHz	Fixed Fixed- Satellite (Earth- To- Space) Mobile	
29.1- 29.5GHz	Fixed Fixed- Satellite (Earth- To- Space) Mobile	
29.9- 30GHz	Fixed- Satellite (Earth- To- Space) Mobile- Satellite (Earth- To- Space)	
30- 31GHz	Fixed- Satellite (Earth- To- Space) Mobile- Satellite (Earth- To- Space)	
31- 31.3GHz	Fixed	Fixed point to point linking

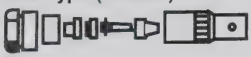
31.3- 31.5GHz	Radio Astronomy Space Research (Passive) Radio Navigation	
31.5- 31.8GHz	Radio Astronomy Space Research (Passive) Fixed Mobile Except Aeronautical Mobile	
31.8- 32GHz	Fixed Radio Navigation	
32- 32.3GHz	Fixed Radio Navigation	
32.3- 33GHz	Fixed Radio Navigation	
33- 33.4GHz	Fixed Radio Navigation	
33.4- 34.2GHz	Radio Location	33.4- 36GHz SRD radiolocation usage
34.2- 34.7GHz	Radio Location	
34.7- 35.2GHz	Radio Location	
35.2- 35.5GHz	Meteorological Aids Radio Location	
35.5- 36GHz	Meteorological Aids Radio Location Space Research (Active)	
36- 37GHz	Fixed Mobile Space Research	
37- 37.5GHz	Fixed	Fixed "38g" band 37.058- 38.178GHz alpha transmit 38.248- 39.438GHz beta transmit extensive use for inter- cell site linking
43.5- 47GHz		46.7- 46.9GHz SRD field disturbance sensor usage
47- 47.2GHz	Amateur Amateur- Satellite	Amateur usage
50.4- 51.4GHz	Fixed	50.5- 51.15GHz fixed "50G" band 50.42- 50.62GHz alpha transmit 50.92- 51.12GHz beta transmit 51.15- 51.4GHz not allocated
54.25- 55.78GHz	Space Research (Passive)	
57- 58.2GHz	Fixed	Fixed "60g" band 57.2- 57.7GHz alpha transmit 57.7- 58.2GHz beta transmit short range broadband linking in Wellington
59- 59.3GHz		59- 64GHz SRD radiolocation usage
59.3- 64GHz		59- 64GHz SRD radiolocation usage 61- 61.5GHz ISM usage
64- 65GHz	Fixed Mobile	
76- 77.5GHz		76- 77GHz SRD field disturbance sensor usage
81- 84GHz	Radio Location Amateur Amateur- Satellite	Band identified for the possible introduction of vehicular collision avoidance radar
119.98- 122.25GHz		122- 123GHz SRD unrestricted usage
122.25- 123GHz		122- 123GHz ISM
123- 130GHz	Fixed Mobile	122- 123GHz
241- 248GHz	Radio Location Amateur Amateur- Satellite	241- 248GHz amateur usage 244- 246GHz SRD unrestricted usage and ISM usage
248- 250GHz	Radio Location Amateur Amateur- Satellite	248- 250GHz amateur usage
250- 252GHz	Amateur Amateur- Satellite	

Abbreviation	Meaning
(OR)	Off-route, used in conjunction with Aeronautical Mobile Service
(R)	En-route, used in conjunction with Aeronautical Mobile Service
AMPS	Advanced Mobile Phone System
Cospas – Sarsat	International Satellite System for Search and Rescue
DAMPS	Digital Advanced Mobile Phone System
DECT	Digital Enhanced Cordless Telecommunications
DGPS	Differential Global Positioning System used for correcting dithered GPS signals to improve accuracy.
DSC	Distress and Safety Calling
DTH	Direct to Home (reception), used in conjunction with the Fixed Satellite Service
EPIRB	Emergency Position Indicating Radio Beacon
FWA	Fixed Wireless Access
GMDSS	Global Maritime Distress and Safety System
GPS	Global Positioning System
GSM	Global System for Mobile communications

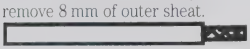
Abbreviation	Meaning
ILS	Instrument Landing System
IRR	International Radio Regulations
ISM	Industry, Scientific, and Medical
ITU	International Telecommunications Union
LMDS	Local Multipoint Distribution Service
MLS	Microwave Landing System
MR #	Management Right (the # signifies an integer identification number).
NDB(s)	Non-Directional Beacon(s)
PCS	Personal Communications System
PHS	Personal Handyphone System
PRS	Personal Radio Service
RADAR	Radio Detection And Ranging
RLAN	Radio Local Area Network
RRD(s)	Restricted Radiation Device(s), also known as Short Range Device(s) or SRD(s)
SAR	Search And Rescue
SRD(s)	Short Range Device(s), also known as Restricted Radiation Device(s) or RRD(s)
VSAT	Very Small Aperture Terminals

COAXIAL PLUG ASSEMBLY

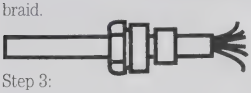
BNC Type (Female)



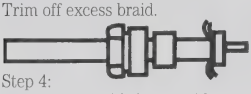
Step 1:
Cut end of cable evenly and remove 8 mm of outer sheat.



Step 2:
Side clamp nut and pressure sleeve over cable, and comb out braid.

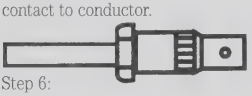


Step 3:
Fold braid back and insert ferrule between braid and dielectric. Trim off excess braid.



Step 4:
Remove 5 mm of dielectric without damaging centre conductor. Tin conductor.

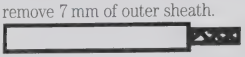
Step 5:
Slide rear insulator over conductor hard against rear insulator. Solder contact to conductor.



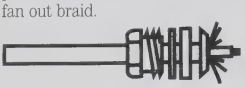
Step 6:
Fit front insulator in body and push sub-assembly onto body. Slide pressure sleeve into body and screw in the clamp nut to clamp cable.

BNC Type (Male)

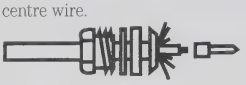
Step 1:
Cut end of cable evenly, and remove 7 mm of outer sheath.



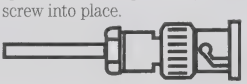
Step 2:
Slide clamp-nut, washer and rubber spacer over cable. Slide pressure sleeve over braid, and fan out braid.



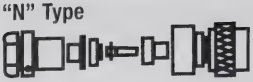
Step 3:
Fold back braid against pressure sleeve and trim off excess. Strip 4 mm of inside insulation off centre wire. Solder pin onto centre wire.



Step 4:
Fit assembly, pin first, into main receptacle. Push washer, rubber spacer and clamp nut up and screw into place.

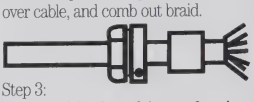


"N" Type

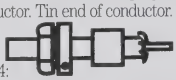


Step 1:
Cut end of cable evenly and remove 9 mm of outer sheath.

Step 2:
Slide clamp nut and pressure sleeve over cable, and comb out braid.

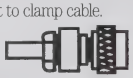


Step 3:
Fold braid back and insert ferrule between braid and dielectirc. Trim off excess braid and remove 5.5 mm dielectric without damaging inner conductor. Tin end of conductor.



Step 4:
Slide rear insulator over conductor and position against end of dielectric. Slide contact over conductor until hard against rear insulator. Solder contact to conductor.

Step 5:
Fit front insulator in body and push sub-assembly into body. Slide pressure sleeve into body and screw in the clamp nut to clamp cable.

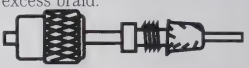


UHF Type

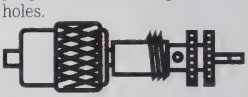
Step 1:
Cut end of cable evenly and remove 27 mm of outer sheath.

Step 2:
Slide coupling ring and adaptor onto sheath. Fan braid back over sheath.

Step 3:
Compress braid around cable and position adaptor so braid fans over adaptor. Trim off excess braid.



Step 4:
Remove 12.5 mm dielectric and tin conductor. Screw the plug assembly onto cable and solder plug to braid through solder holes.



Step 5:
Solder conductor to centre pin and screw coupling ring onto assembly.

COAXIAL CABLE SPECIFICATIONS

Type	Nom. Imp Zo	Outer Dia (mm)	Nominal Attenuation (dB/100 m) 50 MHz	100 MHz	200 MHz	400 MHz	1 GHz	Vel Factor %	Cap pF/m	Volts Vrms
RG-8/U	52	10.3	5.2	7.2	10.5	15.4	29.2	66.0	96.8	5000
RG-9/U	51	10.67	5.2	7.2	10.5	15.4	29.2	66.0	67.3	5000
RG-11/U	75	10.29	4.3	6.6	9.5	13.8	22.3	66.0	67.3	5000
RG-58/U	53.5	4.95	10.2	14.8	22.3	32.8	55.8	66.0	93.5	1900
RG-58A/U	50	4.95	10.8	16.1	23.9	37.7	70.5	66.0	101.0	1900
RG-58C/U	50	4.95	10.8	16.1	23.9	37.7	70.5	66.0	101.0	1900
RG-59/U	73	6.15	7.9	11.2	16.1	23.3	39.4	66.0	68.9	2300
RG-59B/U	75	6.15	7.9	11.2	16.1	23.0	39.4	66.0	67.3	2300
RG-62/U	93	6.04	6.2	8.9	12.5	17.7	28.5	84.0	44.3	700
RG-62B/U	93	6.15	6.6	9.5	13.8	20.0	36.1	84.0	44.3	700
RG-122/U	50	4.06	14.8	23.0	32.8	49.9	87.0	66.0	101.0	1900
RG-141A/U	50	4.06	6.9	10.5	15.4	22.6	41.7	69.5	95.1	1900
RG-142B/U	50	4.95	8.9	12.8	18.4	26.9	44.3	69.5	95.2	1900
RG-174/U	50	2.56	21.7	29.2	39.4	57.4	98.4	66.0	101.0	1500
RG-178B/U	50	1.83	34.4	45.9	62.3	91.9	150.9	69.5	95.1	1000
RG-178B/U	75	2.54	27.9	32.8	41.0	52.5	78.7	69.5	64.0	1200
RG-180B/U	95	3.56	15.1	18.7	24.9	35.1	55.8	69.51	49.2	1500
RG-187A/U	75	2.66	37.9	32.8	41.0	52.5	78.7	69.5	64.0	1200
RG-188A/U	50	2.59	31.5	37.4	46.6	54.8	101.7	69.5	95.2	1200
RG-196A/U	50	1.93	34.4	45.9	62.3	91.9	150.9	95.2	1200	
RG-213/U	50	10.29	5.2	7.2	10.5	15.4	29.2	66.0	101.0	5000
RG-214/U	50	10.8	5.2	7.2	10.5	15.4	29.2	66.0	101.0	5000
RG-223/U	50	5.38	10.1	14.8	21.0	30.2	63.5	66.0	101.0	1900
RG-303/U	50	4.31	6.9	10.5	15.4	22.6	42.7	69.5	95.2	1900
RG-316/U	50	2.49	30.8	34.1	43.3	54.1	101.7	69.5	95.2	1200
BEL 9913	50	10.29	3.0	4.5	5.9	8.5	14.8	84.0	78.7	—

NB: Except for Belden 9913, all specifications are referenced to MIL-C-17D/F or JAN-C-17A as applicable.

COMMONLY USED SYMBOLS & ABBREVIATIONS

A	ampere, amplification factor
AC	alternating current
A/D	analogue-to-digital
AF	audio frequency
afc	automatic frequency control
afsk	audio frequency shift keying
agc	automatic gain control
Ah	ampere hour
alc	automatic load (or level) control
AM	amplitude modulation
a.m.	morning
AMSAT	Radio Amateur Satellite Corporation
AMTOR	Amateur Teleprinting Over Radio
anl	automatic noise limiter
ant	antenna
AOS	acquisition of signal
ARA	Amateur Radio Association
ARC	Amateur Radio Club
AREC	Amateur Radio Emergency Corps
ARS	Amateur Radio Society; Amateur Radio Station
ASCII	American National Standard Code for Information Interchange
ATV	amateur television
avc	automatic volume control
AWG	American wire gauge
az-el	azimuth-elevation

B	flux density; susceptance
BASIC	Beginner's All-purpose Symbolic Instruction Code (computer language)
b	byte (a group of bits or binary digits, usually eight)
bc	broadcast
BCD	binary-coded-decimal
BCI	broadcast interference
bcl	broadcast listener
bd	baud (bits/sec)
ber	bit error rate
bit	binary digit
BFO	beat-frequency oscillator
bpf	band pass filter
bw	bandwidth
byte	computer word, 8 bits

C	Celsius, capacity, Coulomb
c	velocity of EM waves
CATV	cable television
CB	citizens band
CCIR	International Radio Consultative Committee
CCIT	Consultative Committee for International Telegraph and Telephone (ITU)
CCS	constant current source
cctv	closed circuit television
ccw	coherent CW; counter-clockwise
CD	Civil Defence
Ch	channel
cm	centimetre
CMOS	(or COSMOS)—complimentary-symmetry metaloxide semiconductor
coax	coaxial cable or connector
COR	carrier-operated relay
CPU	central processing unit
CQ	general call to all stations
CRT	cathode-ray tube
ct	centre tap
CTCSS	continuous tone coded squelch system
CW	continuous wave (code); clockwise

D	electrostatic displacement; flux density
D/A	digital-to-analogue
dB	decibel
dBd	antenna gain referenced to a dipole
DBDM	double-balance diode mixer
dBi	antenna gain referenced to an isotropic, a dipole has a gain of 2.14 dBi
dBm	decibel referred to 1 milliwatt
dBW	decibel referred to 1 watt
DC	direct current
det	detector
DF	direction finder; direction finding
DIP	dual-in-line package, 14 to 16 pins
dpdt	double-pole double-throw
dpst	double-pole single-throw
dsb	double sideband
DTL	diode-transistor logic
DTMF	dual tone multi-frequency
DVM	digital voltmeter
DX	long distance
DXCC	DX Century Club

E	voltage
e	base of Naperian logs
ECL	emitter-coupled logic
ECO	electron-coupled oscillator
EHF	extra high frequency (30– 300 GHz)
EHT	extra high tension
eirp	effective isotropic radiated power
EMC	electro-magnetic capability
E-M-E	earth-moon-earth (moonbounce)
emf	electromotive force (voltage)
EMI	electro-magnetic interference
EMP	electromagnetic pulse
EPROM	erasable programmable read-only memory
EUV	extreme ultra-violet radiation
EQX	equator crossing
erp	effective radiated power

f	frequency
F	farad; Fahrenheit
FAX	facsimile
FCC	Federal Communications Commission
FD	Field Day
FET	field-effect transistor
FF	flip-flop
FM	frequency modulation
FMT	frequency measuring test
FMTAG	Frequency Management Technical and Advisory Group
fot	optimum working frequency
fsd	full scale deflection
FSK	frequency-shift keying

g	gram
G	giga (109); conductance; magneto motive force
GaAs FET	gallium arsenide field-effect transistor
GDO	grid-dip or gate-dip oscillator
GHz	gigahertz
gnd	ground
GPRS	General Packet Radio Service
GPS	Global Positioning System
GSM	Globa System for Mobile Systems

H	henry; magnetic field strength
HAAT	height above mean terrain
HF	high frequency (3–30 MHz)
HFO	heterodyne-frequency oscillator
hpf	highest possible frequency; high pass filter
HT	high tension
Hz	hertz

I	current
IARU	International Amateur Radio Union
IC	integrated circuit
i-d	identification; identifier
ID	inside diameter
IF	intermediate frequency
IMD	inter-modulation distortion
I/O	input/output
IRC	international reply coupon
ISB	independent sideband
ITU	International Telecommunication Union
IW	Intruder Watch (Monitoring Service)

J	Joule
j	indicator for reactive component of an impedance; (+j inductive; –j capacitive); joule
JFET	junction field-effect transistor

k	kilo (1000)
K	kilobyte; specific inductive capacity; Kelvin; dielectric constant
kg	kilogram
kHz	kilohertz (10^3)
km	kilometre
kV	kilovolt
kW	kilowatt
kWh	kilowatt hour

L	self inductance
LC	inductance-capacitance
LCD	liquid crystal display
LED	light-emitting diode
LF	low frequency (30–300 kHz)
lhcp	left-hand circular polarisation
LO	local oscillator
loran	long-range navigation
LOS	loss of signal
lp	long periodic; long path
LSB	lower sideband; least signifcant bit
LSI	large-scale integration
LT	low tension
luf	lowest usable frequency
lw	longwave; long wire

m	metre (distance or band); milli (10^{-3}); mass
M	mega (10^{6}); mutual inductance
mA	milliampere (one-thousandth of an Amp)
mAH	milliampere hour
MARS	Military Affiliate Radio System
MATV	multi-access television
MF	medium frequency (300–3000 kHz)
mH	millihenry
MHz	megahertz (106)
mike; mic	microphone
mini-DIP	dual-in-line package of 8 pins
mi/h	miles per hour
mi/s	miles per second
mix	mixer
mm	millimetre
MO	master oscillator
MOS	metal oxide semiconductor
mod	modulator
modem	modulator/demodulator
MOX	manually operated switching
ms	millisecond
m.s.	meteor scatter
m/s	metres per second
MSB	most significant bit
MSI	medium-scale integration
MSTV	medium-scan television
MUF	maximum usable frequency
MUX	multiplex; multiplexer
mV	millivolt
mW	milliwatt

N	modulation factor
n	nano (10–9)
nbfm	narrow-band frequency modulation
nbvm	narrow-band voice modulation
n.c.	no connection
NC	normally closed
NF	noise figure
NiCad	nickel cadmium
NL	noise limiter
NMOS	n-channel MOS
NO	normally open
npn	negative-positive-negative
nS	nanosecond
NZART	New Zealand Association of Radio Transmitters

OD	outside diameter
OM	old man
op amp	operational amplifier
osc	oscillator
OSCAR	Orbiting Satellite Carrying Amateur Radio
OTC	Old Timers' Club
oz	ounce

p	pico (10–12)
P	power
PA	power amplifier; public address system
PAM	pulse amplitude modulation
PCB	printed (or etched) circuit board
PCM	pulse code modulation
PEP	peak envelope power
pF	picofarad
ph	phone
PIN	positive intrinsic negative
PIV	peak inverse voltage
pk	peak
pk-pk	peak to peak
PLL	phase-locked loop
PM	phase modulation
p.m.	afternoon/night
PMOS	p-channel MOS
pnp	positive-negative-positive
ppi	plan position indicator (radar)
pot	potentiometer
PROM	programmable read-only memory
PRV	peak reverse voltage
PSK	phase-shift keying
PTO	permeability-tuned oscillator
PTT	push-to-talk
PSU	power supply unit

Q	figure of merit (tuned circuits); charge; quantity
QRP	low power (less than 10 watts input)
QTHR	address correct in *Call Book*

R	resistance
RAM	random access memory
R/C	radio control
R-C	resistor-capacitor
rcvr	receiver
rev/min	revolutions per minute
RF	radio frequency
RFC	radio-frequency choke
RFI	radio-frequency interference
rhcp	right-hand circular polarisation
RI	Radio Inspector
RIT	receiver incremental tuning
RLC	resistor, inductance, capacitor network
rms	root-mean-square
RO	Radio Officer
ROM	read-only memory
rptr	repeater
RS	Radiosport Satellite (USSR)
RSGB	Radio Society of Great Britain
RST	readability-strength-tone
RT	radiotelephone
RTL	resistor-transistor logic
RTTY	radioteletype
Rx	receiver

S	second; magnetic reluctance; Siemens
SAE	self-addressed envelope
SASE	stamped SAE
SCR	silicon-controlled rectifier
SHF	super-high frequency (3–30 GHz)
SINAD	Ratio of Signal to Noise and Distortion
SM	silver mica (capacitor)
SNR; S/N	signal-to-noise ratio
spdt	single-pole double-throw
spst	single-pole single-throw
SS	sweepstakes; spread spectrum
SSB	single sideband
SSC	AMSAT Phase III special service channels
SSI	small-scale integration
SSTV	slow-scan television
STSP	short-term special purpose (FM repeaters)
SWL	shortwave listener
SWR	standing-wave ratio
sync	synchronous; synchronising
SYNCART	synchronous satellite carrying Amateur Radio Transponder

t	time; temperature C
T	period; temperature K
TA	technical adviser
TCA	time of closest approach
TE	trans-equatorial (propagation)
tfc	traffic
THz	tetrahertz (1012)
THD	total harmonic distortion
tpi	turns per inch
T-R	transmit-receive
TTL; T2L	transistor-transistor logic
TTY	teletypewriter (from Teletype, the trade mark of Teletype Corporation)
TV	television
TVI	television interference
Tx	transmitter

UHF	ultra-high frequency (300–3000 MHz)
UJT	uni-junction transistor
UoSAT	University of Surrey educational/research satellite (Great Britain)
USB	upper sideband
UTC	Universal Co-ordinated Time
uV	ultra-violet light

V	volt; voltage
VA	Volt-Ampere
VCO	voltage-controlled oscillator
VCR	video cassette recorder
VCXO	voltage-controlled crystal oscillator
VFBO	variable-frequency beat oscillator
VFO	variable frequency oscillator
VHF	very-high frequency (30–300 MHz)
VLSI	very large scale integration
VOM	volt-ohm-milliammeter
VOX	voice-operated switching
VR	voltage regulator
VSWR	voltage standing-wave ratio
VTVM	vacuum-tube voltmeter
VU	volume unit
VXO	variable crystal oscillator

W	watt; work
WAC	Worked All Continents
WARC	World Administrative Radio Conference
WAS	Worked All States
wbfm	wide-band FM
Wh	watt-hours
wpm	words per minute
ww	wire wound; wire wrap
wx	weather

X	reactance; electrostatic field strength
xcvr	transceiver
XO	crystal oscillator
xfmr	transformer
xmtr	transmitter
xtal	crystal
XYL	wife

Y	admittance
YF	wife
YL	young lady or lady operator

Z	impedance; UTC time

Conversion Factors (Metric-Imperial)

1 millimetre (mm)	= 0.03937 inch
1 centimetre (cm) = 10mm	= 0.3937 inch
1 metre (m) = 100cm	= 39.37 inches, 3.28 feet, 1.094 yards
1 kilometre (km) = 1000m	= 3280.8 feet, 1094 yards, 0.621 miles
1 gram (g) = 1000mg	= 0.03574 ounces
1 kilogram (kg) = 1000g	= 2.2046 pounds
1 tonne (t) = 1000kg	= 0.98 ton, 2204.6 pounds
1 cubic centimetre (cm^3) = 1000mm^3	= 0.6102 cubic inches
1 cubic metre (m^3)	= 35.3 cubic feet, 1.3 cubic yards
1 litre (l)	= 0.220 imperial gallons, 0.264 US gallons
1 kilopascal (kP)	= 0.145 lbs/sq. inch, 0.009867 atmospheres
1 kilojoule (kJ)	= 0.948 BTU, 0.239 kilocalories, 737.56ft/lb
1 kilowatt (kW)	= 1.34 horsepower, 73.7ft.lb/sec
1 Newton (N)	= 0.2248lb force
1 Tesla (T)	= 10,000 gauss
1 Weber (W)	= 10^8 Maxwell

Prefixes for Multiples and Sub-multiples of Quantities

Multiple or Sub-multiple	Name	Prefix
10^{12}	Tera	T
10^9	Giga-	G
10^6	Mega-	M
10^3	Kilo-	k
10^2	Hecto	h
10	Deca	da
10^{-1}	Deci	d
10^{-2}	Centi-	c
10^{-3}	Milli-	m
10^{-6}	Micro-	µ
10^{-9}	Nano-	n
10^{-12}	Pico-	p
10^{-15}	Femto	f
10^{-18}	Atto-	a

Preferred Number Series

(a) 10% Tolerance E12

10 12 15 18 22 27 33 39 47 56 68 82

(b) 5% Tolerance E24

10 11 12 13 15 16 18 20 22 24 27 30
33 36 39 43 47 51 56 62 68 75 82 91

DC resistance of conducting materials relative to copper

Material	Resistance Ratio	Material	Resistance Ratio
Aluminium	1.6	Nichrome	63.0
Brass	3.8	Nickel	4.1
Cadmium	4.1	Phosphor Bronze	6.7
Chromium	12.0	Platinum	6.4
Copper	1.0	Silver	0.97
Gold	1.4	Stainless Steel	43.0
Iron	5.9	Tin	6.6
Lead	12.0	Zinc	3.6

Useful Formulae

- Wavelength (in metres)
  Free space = 300/f(MHz)
  Half-wave wire dipole = 143/f(MHz)
- Resonant frequency of an LC circuit
  $f = 0.159155/\sqrt{(LC)}$
- The quality factor or Q of a circuit at resonance is
  $Q = 2\pi f L/r$
- The 3 dB bandwidth of such a single tuned circuit
  B = f(res)/Q
- Estimate of transformer rating
  Output = 31 A^2 Watts
  where A = core cross-section in sq.ins.
  or Output = 4.8 A^2 Watts if A is in sq.cm.

Ohms Law

$V = IR = W/I = \sqrt{WR}$
$I = V/R = W/V = \sqrt{W/R}$
$R = V/I = V^2/W = W/I^2$
$W = VI = I^2 R = V^2/R$

Mains Plug Wiring

Phase	Brown	Red
Neutral	Blue	Black
Earth	Green/Yellow	Green

Average, Peak, RMS Values

	Multiplication factor for sine wave			
	Average	RMS	Peak	Peak-Peak
Average	—	1.1133	1.573	3.143
RMS	0.933	—	1.414	2.828
Peak	0.637	0.7073	—	2.033
Peak-Peak	0.323	0.3535	0.533	—

Colour Codes

Tantalum Capacitors

Top/Middle band: Value in µF (2 digits)

Middle Spot: Multiplier

Bottom band: Maximum voltage

Colour	Value	Multiplier	Voltage
Black	0	×1	10.0
Brown	1	×10	1.6
Red	2	×100	0.4
Orange	3	×1k	40.0
Yellow	4	×10k	6.3
Green	5	×100k	16.0
Blue	6		20.0
Violet	7	×0.0001	
Grey	8	×0.01	25.0
White	9	×0.1	2.5

Capacitors

Top band: First digit of value
Second band: Second digit of value (gives value in pF)

Third band: Multiplier

Fourth band: Tolerance—White 10%, Black 20%

Bottom Band: Voltage

Resistors

Bands from closest to lead:

First digit of value

Second digit of value

Multiplier

Tolerance

Colour	Value	Multiplier	Tolerance
Black	0	×1	
Brown	1	×10	1%
Red	2	×100	2%
Orange	3	×1 k	
Yellow	4	×10 k	
Green	5	×100 k	
Blue	6	×1 M	
Violet	7	×10 M	
Grey	8		
White	9		
Gold			5%
Silver			10%
No band			20%

Notes

1. 1% tolerance resistors have five bands. The first three give three digits of value, the rest as above.
2. Bands are closer to one end of the resistor. Read bands in sequence from this end.

Hexadecimal Constants

Hex Code	Most Significant Bytes		Least Significant Bytes	
0	0	0	0	0
1	4096	256	16	1
2	8192	512	32	2
3	12288	768	48	3
4	16384	1024	64	4
5	20480	1280	80	5
6	24567	1536	96	6
7	28672	1792	112	7
8	32768	2048	128	8
9	36864	2304	144	9
A	40960	2560	160	10
B	45056	2816	176	11
C	49152	3072	192	12
D	53348	3328	208	13
E	57344	3584	224	14
F	61440	3840	240	15

HEX TO DECIMAL CONVERSION
Decimal Value = IV + III + II + I

ASCII Character Codes as defined in ANSI X3.4

Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char
0	0	NUL	32	20	SPACE	64	40	@	96	60	—
1	1	SOH	33	24	!	65	41	A	97	61	a
2	2	STX	34	22	"	66	42	B	98	63	b
3	3	ETX	35	34	#	67	43	C	99	63	c
4	4	EOT	36	24	$	68	44	D	100	64	d
5	5	ENQ	37	25	%	69	45	E	101	65	e
6	6	ACK	38	26	&	70	46	F	102	66	f
7	7	BEL	39	27	'	71	47	G	103	67	g
8	8	BS	40	28	(	72	48	H	104	68	h
9	9	HT	41	29	)	73	49	I	105	69	i
10	A	LF	42	2A	*	74	4A	J	106	6A	j
11	B	VT	43	2B	+	75	4B	K	107	6B	k
12	C	FF	44	2C	,	76	4C	L	108	6C	l
13	D	CR	45	2D	-	77	4D	M	109	6D	m
14	E	SO	46	2E	.	78	4E	N	110	6E	n
15	F	SI	47	2F	/	79	4F	O	111	6F	o
16	10	DLE	48	30	0	80	50	P	112	70	p
17	11	DC1	49	31	1	81	51	Q	113	71	q
18	12	DC2	50	32	2	82	52	R	114	72	r
19	13	DC3	51	33	3	83	53	S	115	73	s
20	14	DC4	52	34	4	84	54	T	116	74	t
21	15	NAK	53	35	5	85	55	U	117	75	u
22	16	SYN	54	36	6	86	56	V	118	76	v
23	17	ETB	55	37	7	87	57	W	119	77	w
24	18	CAN	56	38	8	88	58	X	120	78	x
25	19	EM	57	39	9	89	59	Y	121	79	y
26	1A	SUB	58	3A	:	90	5A	Z	122	7A	z
27	1B	ESC	59	3B	;	91	5B	[	123	7B	{
28	1C	FS	60	3C	<	92	5C	\	124	7C	|
29	1D	GS	61	3D	=	93	5D	]	125	7D	}
30	1E	RS	62	3E	>	94	5E	→	126	7E	–
31	1F	US	63	3F	?	95	5F	_	127	7F	DEL

ASCII Control Codes

NUL	(Ctrl @)	Null	DLE	(Crtl P)	Data Link Escape
SOH	(Ctrl A)	Start of Heading	DC1	(Ctrl Q)	Device Control 1
STX	(Ctrl B)	Start of Text	DC2	(Ctrl R)	Device Control 2
ETX	(Ctrl C)	End of Text	DC3	(Ctrl S	Device Control 3
EOT	(Ctrl D)	End of Transmission	DC4	(Ctrl T)	Device Control 4
ENQ	(Ctrl E	Enquiry	NAK	(Ctrl U)	Negative Acknowledge
ACK	(Ctrl F)	Acknowledge	SYN	(Ctrl V	Synchronous Idle
BEL	(Ctrl G)	Bell	ETB	(Ctrl W)	End of Transmission Block
BS	(Ctrl H)	Back Space	CAN	(Ctrl X)	Cancel
HT	(Ctrl I)	Horizontal Tab	EM	(Ctrl Y)	End of Medium
LF	(Ctrl j)	Line Feed	SUB	(Ctrl Z)	Substitute
VT	(Ctrl K)	Vertical Tab	ESC	(Ctrl [)	Escape
FF	(Ctrl L)	Form Feed	FS	(Ctrl \)	File Separator
CR	(Ctrl M)	Carriage Return	GS	(Ctrl])	Group Separator
SO	(Ctrl N)	Shift Our	RS	(Ctrl ^)	Record Separator
SI	(Ctrl O)	Shift In	US	(Ctrl _)	Unit Separator

The RS-232C Interface

The basic RS-232C Electrical specifications

Communication rate:
0–20,000 bits per second

Driver output voltage levels, maximum no load:
–25 V logic 1, + 25 V logic Ø

Driver output voltage ranges for loads between 3 k and 7 k Ohms:
Logic 1: – 15 V (7 k) and –5 V (3 k)
Logic Ø: + 15 V (7 k) and + 5 V (3 k)

Driver output current, short circuit:
500 mA maximum

Driver output impedance with power off:
300 Ω minimum

Maximum driver output slew rate:
30 V per microsecond

Receiver input resistance:
7 k Ω maximum
3 k Ω minimum

Effective receiver input capacitance:
2500 pF maximum

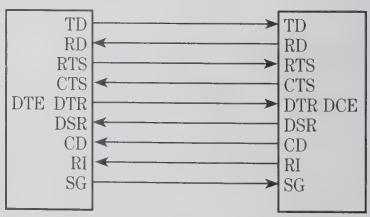
Maximum receiver input voltage range:
– 25 V to + 25 V

The following table shows the nine most common signals used for serial communications and their PIN allocations for nine and 25 PIN connectors:

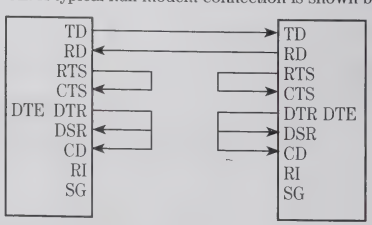
Signal Name		PIN No. (9 pin)	PIN No. (25 pin)
TD	Transmitted Data	3	2
RD	Received Data	2	3
RTS	Request To Send	7	4
CTS	Clear To Send	8	5
DSR	Data Set Ready	6	6
SG	Signal Ground	5	7
CD	Carrier Detect	1	8
DTR	Data Terminal Ready	4	20
RI	Ring Indicator	9	22

Common RS-232C Connections

Each signal (except ground) is either an input or an output depending whether it is on the Data Terminal Equipment (DTE) (eg, a computer terminal) or the Data Circuit Terminating Equipment (DCE) (eg, a modem). A typical connection is shown below.



When two computer terminals (DTEs) are connected together, a "null modem" hook-up is needed to fool each DTE into thinking that it is connected to DCE. A typical null modem connection is shown below.



BASIC & DERIVED SI UNITS—CONVERSION FACTORS

Basic SI Units

Quantity	Name of unit	Unit symbol
Electric current	ampere	A
Length	metre	m
Luminous intensity	candela	cd
Mass	kilogramme	kg
Thermodynamic temperature	degree Kelvin	°K
Time	second	s

Derived SI Units

Physical quantity	SI unit	Unit symbol
Electric capacitance	farad	F = A s/V
Electrical charge	coulomb	C = A s
Electrical potential	volt	V = W/A
Electric resistance	Ohms	Ω = V/A
Force	Newton	N = kg m/s^2
Frequency	Hertz*	HZ = s^{-1}
Illumination	lux	lx = lm/m^2
Inductance	Henry	H = V s/A
Luminous flux	lumen	lm = cd sr
Magnetic flux	Weber	Wb = V s
Magnetic flux density	Tesla†	T = Wb/m^2
Power	Watt	W = J/s
Work energy, quantity of heat	joule	J = N m

*Hertz is equivalent to cycle per second.
†Tesla is equivalent to Weber per square metre.

Conversion factors

To convert	into	Multiply by	Conversely
Amp hours	Coulombs	3600	2.778×10^{-4}
Atmospheres	Lb/sq.in	14.70	0.068
Centigrade	Kelvin	°C+273 = °K	°K – 273 = °C
Cubic inches	Cubic feet	5.787×10^{-4}	1728
Cubic inches	Cubic metres	1.639×10^{-5}	6.102×10^{4}
Degrees	Radians	1.754×10^{-2}	57.3
Dynes	Pounds	2.248×10^{-6}	4.448×10^{5}
Ergs	Foot pounds	7.376×10^{-8}	1.356×10^{7}
Feet	Centimetres	30.48	3.281×10^{-2}
Foot pounds	Kilowatt hours	3.766×10^{-7}	2.655×10^{6}
Gausses	Lines per sq.in.	6.452	0.155
Grams	Dynes	980.7	1.02×10^{-3}
Grams per cm	Pounds per in	5.6×10^{-3}	178.6
Horsepower	Kilowatts	0.746	1.341
Inches	Centimetres	2.54	0.3937
Kilograms	Pounds (lb)	2.205	0.454
Kilometres	Feet	3281	3.048×10^{-4}
Kilometres	Nautical miles	0.540	1.853
Kilometres	Statute miles	0.621	1.609
Kilowatt hours	Joules	3.6×10^{6}	2.778×10^{-7}
Kilowatt hours	HP hours	1.341	0.7457
Knots	Miles per hour	1.1508	0.869
Lamberts	Candles per sq.cm	0.3183	3.142
Lamberts	Candles per sq.in	2.054	0.4869
Lumens per sq.ft	Foot candles	1	1
Lux	Foot candles	0.092892	10.764
Metres	Feet	3.28	10.764
Metres	Yards	1.094	0.9144
Miles per hour	Feet per second	1.467	0.68182
Nepers	Decibels	8.686	0.1151
Tons	Pounds	2240	4.464×10^{-4}
Watts	Ergs per second	10^{7}	10^{-7}

OLD TIMERS CLUB

The objects of the Old Timers' Club (ZL) are set out in our Constitution adopted in 1993. They are as follows:

1. To recognise service to Amateur Radio;
2. To revive and maintain interests and good fellowship among the older members in the common cause.
3. To offer advice and encouragement to newer Amateurs.

The Club is affiliated to the New Zealand Association of Radio Transmitters (Inc).

The Annual General Meeting is held on the Sunday morning of Queen's Birthday weekend (in conjunction with the NZART Conference).

Grand Old Man: Ivan Horn, ZL2ATU, *Secretary/ Treasurer:* Roy Symon, ZL2KH, *Postal Address:* OTC, 25 Annandale St, New Plymouth 4310, *Phone:* 06-758-2156, *E-mail:* zl2kh@xtra.co.nz

Roy can also be contacted during the OTC Net on 3.870 MHz.

Any material for the Break-In page should be sent to: ZL2KH, 25 Annandale St, New Plymouth.

Net Controllers:
Roy Symon ZL2KH
Don Dalrymple ZL3SZ
Stuart Watchman ZL2TW
Pete Moore ZL2AUB
80 m AM Phone–Doug Alexander ZL2AWF

District Representatives:
Tom Spackman ZL1WW, Don Dalrymple ZL3SZ, Stuart Watchman ZL2TW, Peter Anderson ZL1LR,

OTC Scribe: Roy Symon ZL2KH.

A National Single Side-band Net is held every Monday evening at 2030 hrs (local time). The callsign is ZL6OTC. The frequency is 3.870 MHz. An AM Net is also run on Sunday morning at 10.30 am on 3.850 MHz. The Secretary gives the Club News during the SSB Net.

Full membership is available to any holder of a ZL callsign who has held an amateur licence for the last 25 years or more and is still an active amateur.

In addition, Associate Membership is available to any ZL amateur who has attained the age of 60 years (and over) and has been an active amateur for 10 or more years. Voting privileges are not available to Associate Members.

Application Forms for membership may be obtained from a District Representative, from the National Secretary, or can be downloaded from the NZART web page: www.nzart.org.nz . A joining fee of $10.00 is payable on application.

Evidence of eligibility which is to be submitted shall include, full name, present callsign, original call, operator's certificate number and date of original licence. All applications for membership shall be proposed and seconded by present OTC members.

On acceptance, a Certificate is issued to all Full and Associate Members, and they will be listed in the Blue Book.

All members of OTC are eligible to wear the Peacock Blue NZART Badge with callsign so long as they are financial members of NZART. This badge is available from NZART HQ at the current price of the similar black membership badges.

Handsome certificates are sent automatically to those who attain 50, 60 and 70 years of Amateur Service articles relating to all aspects of OTC or of vintage radio for publication in the OTC section of Break-In are welcomed by, and should be addressed to our Scribe, Roy Symon ZL2KH, 25 Annandale St, New Plymouth.

JAMBOREE ON AIR

JOTA is an annual event in which about 500,000 Scouts and Guides in countries all over the world make contact with each other by means of amateur radio. It is a real Jamboree during which Scouting and Guiding experiences are exchanged and ideas are shared, thus enhancing worldwide Scouting and Guiding. JOTA has been held annually since 1958 and Scouts and Guides are encouraged each year to invite radio amateurs to help them take part.

There are great potential benefits to amateur radio by encouraging young people to take part in JOTA as it introduces them to the hobby that you as an amateur enjoy. So it is in the interests of New Zealand amateurs to anticipate invitations by Scouts and Guides and also to approach their leaders, offering services and equipment.

The easiest way for Scouts and Guides to take part in JOTA is for them to visit an amateur station sometime during the JOTA period. At the station, the amateur establishes a contact with another amateur station and then

hands over the microphone to the Scouts and/or Guides. Satellite, Packet, SSTV and other modes of communication (including e-mail) are now used for JOTA as well as the normal modes using HF and VHF/UHF.

Many stations are set up at Scout or Guide Headquarters or at some local "interesting" or appropriate venue. Often, JOTA stations are set up at camps, the radio activities being incorporated into the camping programme.

JOTA is now run concurrently with the Jamboree on the Internet (JOTI), the JOTA and JOTI stations being often combined on the same site. There is much information about JOTA and JOTI on the New Zealand Scouting web pages: <www. scouts.org.nz>, on the world scout JOTA web pages: <www.scout.org/jota> and <www.scout.org/joti>. Also on <www.jimparnell.co.nz/jota/jota.html> and <www.jimparnell.co.nz/joti/joti.html>.

JOTA and JOTI are both co-ordinated by the World Scout Bureau and organised by National Organisers in each Scouting and Guiding country.

JOTA and JOTI are always held during the 48 hours (local time) of the third full weekend in October. Sometimes this weekend is followed by Labour Day (4th Monday in October) and sometimes not.

In the year 2010, JOTA will be held on October 16 and 17. This is not the Labour Day Weekend.

Jim Parnell, ZL2APE
E-mail: jim-p@ihug.co.nz
National Organiser for JOTA and JOTI in New Zealand.

FISTS DOWN UNDER

New Zealand and Australia

FISTS Down Under is the New Zealand and Australian chapter of the FISTS Club, (International Morse Preservation Society) is one where veteran operators help newcomers and less-experienced operators learn and improve CW proficiency. The membership has grown from 300 in its first year of operation to over 5,550 members worldwide. It is one of amateur radio's fastest growing amateur radio organisations.

FISTS Down Under was formed in 1998 with Ralph Sutton ZL2AOH as the New Zealand/Australian coordinator. Membership now stands at over 150.

FISTS supports the use of Morse code

The membership comprises existing and prospective Morse operators and others who support our aims, including short-wave listeners.

We have three straightforward goals:

- Further the use of CW
- Engender friendships among members
- Encourage newcomers to use CW

Brought together by a common love of Morse, FISTS members actively participate in a wide variety of amateur radio activities including nets, rag chewing, earning awards, QRP, contesting and of course "Elmering." All activities include both slow and higher speeds and emphasise courteous operating practices.

FISTS Club membership

FISTS members are young, old, both OMs and YLs—they live all over the world including every State in the USA and all enjoy CW communications at widely varying proficiency levels.

FISTS is not tied to any commercial interests and has no paid employees. VK and ZL members receive "FISTS Down Under, our local monthly newsletter, as well as the UK produced newsletter Key Note and "MorsEAsia" the newsletter of the East Asia" chapter. All activities are funded from annual fees of $15.00 (spouses and dependants of existing members can join at no cost).

Requirements for membership of the FISTS Club are very simple. One simply has to like Morse code! You do not need to be a member of any other organisation and there is no minimum Morse proficiency requirement. You don't even have to be a licensed amateur.

FISTS QSL Bureaus

FISTS operates bureaus in the USA, UK, East Asia and Australia for the quick exchange of QSL cards between members. This is a no-cost service to members.

FISTS contests

FISTS occasionally conducts contests for members and others

FISTS awards

FISTS members participate between themselves in a popular award scheme that includes the following:

- Century award is for 100 FISTS contact points
- Platinum Award is for 100 Century Award contacts
- 250 Century award is for 250 Century Award holder contacts
- 500 Century Award is for 500 Century Award holder contacts
- Silver Award is for 250 FISTS contact points
- Gold Award is for 500 FISTS contact points
- Diamond Award is for 1000 FISTS contact points

Worked FISTS all US States—for exchange between FISTS members in QRP as well as QRO categories.

Affiliation

FISTS Down Under is affiliated to WIA (Wireless Institute of Australia and NZART (New Zealand Association of Radio Transmitters.)

Membership and other inquiries

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ZL3 RADIO BUILDATHON PROJECT

By David W Searle ZL3DWS

Educating And Mentoring Tomorrows Technologists And Communicators

Since 2008, six ZL3 Radio Buildathons have been held in Christchurch. Hams from Branches 05, 56, 68 of NZART and others, have made it happen. In this article we'd like to share with you some ideas that could help you to run a successful Radio Buildathon. Many active amateur radio clubs will have run group kit building sessions for their members. The ZL3 events are a little different in that general members of the public are invited to come along. Radio amateurs mentor their progress and provide immediate help with issues.

Everyone's Invited

Ages can vary from 8 to 81 years, male and female, and can come from a wide variety of backgrounds and cultures. Many may not have seen a soldering iron before, let alone used one. You can imagine we faced some unusual early challenges and a steep learning curve. For example, don't underestimate how quickly 8-12 year olds learn, nor how well the fairer sex of any age can solder. I think I'll definitely contract out the soldering of my next kit!

Funding And Publicity

With funding from the Christchurch City Council, three ZL3 Buildathons were held in quick succession during the July School holidays as part of KidsFest 2010. Some 70,000 kids aged 10-14 years from around Canterbury and beyond received an 82 page CCC KidsFest Guide setting out dozens and dozens of different activities they could enroll in. Our three events involving 57 kids, 20 hams as "mentors" plus numerous parents who decided to share the experience, were booked to overflowing by the end of the first week that bookings opened.

This article is based on meeting the demands of those three KidsFest events, plus three earlier but larger events. It includes a sprinkling of great ideas readily shared by helpful hams in the United Kingdom, South Africa and United States. We might be 12,000 miles away from Europe for example, but the "helpful ham spirit" still travels freely and well.

Why Hold A Buildathon?

The first consideration is why do you want to hold an event? A brain storming session with a small group of early supporters will assist greatly in this process. Here's a few possible objectives to consider: To let your local community know that Amateur Radio still exists? To build a team of enthusiasts who could help others gain their amateur radio licenses? To attract support from various parts of your community so that common goals are achieved? To generate some media attention that will result in more club members? Once these, and other questions are worked through, you can begin to build a list of objectives for your event.

Nicky Wagner MP meets ZL3LD Christchurch's youngest radio amateur at ZL3 Radio Buildathon held on 8 July 2010.

Planning For Success

Having set your objectives the hard part starts. A plan. Who will do what, when, and where. It is also beneficial to create a budget. The funds available, or the lack of them, will quickly help you decide what is possible and what's not. At least for the first couple of events. Typical budget items include: venue hire, essential tools and test equipment, refreshments, work benches, mains cabling & extension boxes, RCD's, printed construction guides and most importantly the kit of parts.

Choosing A Kit Is An Art

The choice of what to build can make or break the success of your event. Carefully consider the following points: How old will the constructors be? How long will it typically take an average person to build the kit? How many parts are involved? What could go wrong during building? What is the cost of 10 or 50 kits? How many spares do you need? How do we present the kit to the builder? Have a sample or two of every kit under consideration built beforehand. You may be surprised how different people can assemble the same kit differently! There is a lot to consider and a lot to recommend the K.I.S.S. principle.

Tony ZL3HAM (centre) coaches careful construction of a ZL3 Buildathon radio

Form Of Construction

With regard to the kit chosen, there are a number of options around what form of construction to use. Common ones include: printed circuit board (with or without overlay) ugly bug (where parts are super glued to a copper board and soldered) or manhattan style (where parts are soldered on raised "lands" isolated from a copper board). Each have their benefits but you'll need to estimate the amount of time a builder will take on average, with the form of building you decide to use.

Construction Guide

The next most important factor to consider is the construction guide you will provide. This can be as simple as a page or two, or a mini book starting with an explanation of major components and the theory of how the circuit works. The age and experience of builders will influence the level of detail probably required. Get it right and the session will proceed smoothly. Get it wrong, and the total time taken may disappoint builders, and could affect the number of helpers who will join you for the next event!

Promotion And The Media

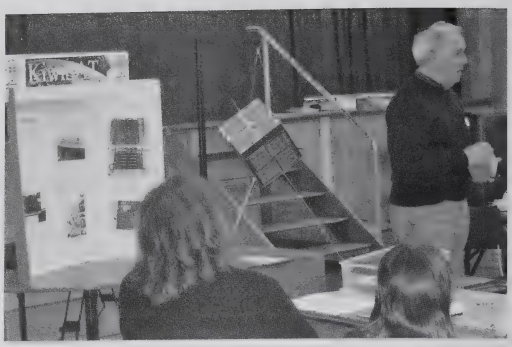
This isn't easy. Before the big day, telephone and/or email local newspapers and radio stations to let them know of your event. Posters in local venues (not just shops) may also be used to spread the word as well as advertise your Club meetings. Ask for publicity ideas at your club, among business colleagues and other groups you may belong to. There are a myriad of organisations that have "Community Notices" that could mention your event. Searching them out initially can be time consuming, but it will get easier. And don't forget to tell NZART, "Break In" and the "Infoline" Editors.

On The Day

If possible, it could be most useful to set out the construction tables and equipment the night before. Lay out the mains cables, connect up the mains outlet boxes and test that the RCD's actually work. It's amazing what worked last time, has a habit of failing 10 minutes before the doors open, or you are short of a vital cable or connector. It happens. Everyone who comes along should sign in as a builder, mentor or parent. Pre-registration helps smooth this process and reduce queues. Name labels with call-signs helps everyone get to know each other quickly. Hams not seen for months at the clubrooms can turn up unexpectedly to lend an appreciative hand. So can lapsed license holders and non club members. It's a great opportunity to welcome them and encourage them to come along to the next club meeting.

Health And Safety Briefing

The importance of this aspect of your event cannot be overstated. During one ZL3 event the fire alarm did go off. About five times! The hall of 40 plus people was cleared in under a minute. We didn't know until later that it was a test. It was a very valuable lesson. Some venues available for hire are regularly checked to an H&S schedule which can be reassuring. You and your helpers must know where the fire alarm is, what to do in the event of an earthquake, where the exits are. Could you find the first aid kit and fire extinguisher quickly. You must then include this vital information in your introduction on the day. Explain to all adults present what they must do to help younger folk to promptly leave the venue in the unlikely event of an emergency.



Terry ZL3QL enthralls the kids with facts and figures on a spaceship called KiwiSAT at the sixth ZL3 Buildathon 15 July 2010

After The Event

Consider asking all participants to complete a simple feedback form. This can be very instructive. Seek suggestions on kits folk would like to build or how to make the Builders Guide better. And yes, 10 year olds can quickly "cut to the chase" and be very bold with suggestions. So be prepared to listen carefully to what they say. All feedback can help you to make the next event even better than the last. Speak with your helpers for feedback too; and a genuine word of thanks goes a long way today. And don't forget to tell NZART, "Break In" and the "Infoline" Editors.

Sources Of Help

The rewards for holding a community building event, like a Buildathon, are numerous. Be aware though it's definitely not like holding a club night, nor a kit building session for hams. It does involve a degree of careful advance planning and plain hard work by a lot of people. A real team effort. If you are thinking of holding a Buildathon do get in touch. We have built up some useful resources that we want to share with you. Just ask. If you know a group or school that would love to be part of the next ZL3 Buildathon, please ask them to visit http://sites.google.com/site/zl3buildathon/ and then email ZL3DWS@nzart.org.nz.

Acknowledgements And Thanks

Sincere thanks are extended to Christchurch City Council, NZART Radioscience Education Trust Inc and the NZ Vintage Radio Society Christchurch for funding; and to all those at NZART Christchurch Branches 05, 56, 68 and all others for your loyal team support and talents. You can all be justly proud of what you have achieved for Amateur Radio and your communities.

Nicky Wagner MP Christchurch Central, shares in the fun at a ZL3 Buildathon on 8 July 2010

NZART RADIO SCIENCE TRUST

by John Walker ZL3IB

What is the NZART Radioscience Education Trust?

The Trust is a fund from which money will be made available for charitable purposes and the objectives of the Trust are set out in a Deed of Trust. It is structured to operate as a charitable trust to maximise the benefits to the recipients. It is governed by three Trustees who are responsible for all aspects of the Trust's opera tion.

What are the Trust's objectives?

The objectives for which the Trust has been established are to apply the Trust's assets within New Zealand to promote and encourage education in radioscience, whether by payment of course fees for worthy candidates, the provision of prizes for excellence in educational activities, grants-in aid, or otherwise as the Trustees think fit. Beneficiaries do not have to be members of NZART, nor will members receive preference.

How does the Trust work?

Currently the Trust provides prizes and awards for students offering a project or exhibit having a radioscience theme at local school Science and Technology Fairs. Organising this activity involves NZART members at national and Branch level throughout the country.

The Trust also offers "Grants-in-Aid" to schools to assist in the development of Science Fair projects and also to organisers of similar promotional activities such as "Buildathons", etc.

Where does NZART fit into this Trust?

The Deed of Trust specifically sets the Association aside from any involvement. In effect, the Trust will be transparent to the Association since the awards, their control, and the financial aspects of the Trust are totally under the control of the Trustees.

How will the Trust's finances grow?

The Trust operates from the income generated by the capital invested and the accrued interest is used to finance the awards and prizes etc. Apart from the foundation donation, other significant capital has come from anonymous donors and surpluses from NZART conferences.

The Trustees welcome inquiries from any person or organisation wishing to support the Trust by donation; replies will be treated in the strictest confidence. The Trustees intend that the fund should grow at least in line with inflation to ensure benefits are not eroded. The Trust is recognised by the IRD as a "Charitable Trust". Briefly, this means that the Trust's income is not taxable and that in most cases donations to the Trust are tax-deductible.

Who are the Trustees and how are they appointed?

The four Trustees are all NZART members of long standing who hold the Association, its aims and objectives at the highest level. The present Trustees are:

Terry Carrell ZL3QL, Christchurch. Life Member, Past- President, and ex-IARU Liaison Officer.

Peter Norden ZL2SJ, Featherston; a former President of NZART.

John Walker ZL3IB, Christchurch. Editor Break-In

Grahame Fraser ZL3SJ Christchurch; Associate Editor Break-In

The President of NZART, in consultation with the Vice-President, will appoint the Trustees as and when necessary.

The Science and Technology Fair Organisation

Nationally, the Science and Technology Fair scheme is sponsored by a number of organisations and, at present, there are 22 regional Science and Technology Fairs whose winners go on to take part in the National Science and Technology Fair. More information on these maybe found on the Royal Society's web page <www. rsnz.govt. nz

What are the prizes for?

The aims of the Trust are broad. The Trustees wish to support and encourage all and any aspect of radioscience. Relevance to amateur radio is a plus but not a prerequisite. For the time being the Trust sponsors a prize to the value of $100 at each of the local area Science and Technology Fairs. Local NZART Branches are asked to provide judges and other forms of support for these events. Prizes will only be awarded where the judges consider there is a worthy recipient.

Starting in 2007 the Trust offered limited "Grants-in-aid" to support suitable radioscience projects in schools and other promational activities such as "Buildathons".. Full details and application forms appear in Break-In and are on the Trust's web page <www.nzart.org.nz/nz/trust.html>

It is hoped that in the long term this two-way exchange will generate interest in radio and electronics leading to more young radio amateurs. At the same time it provides Branches with a means of local involvement and recruitment.

Looking ahead: let's talk about the Trusts, bequests and your will

By supporting the Trust you can partake in the development of new and exciting communications technology that is rapidly adding more options for a career, education, international understanding, and a wonderful pastime. You can help preserve this experience and pass it on to a new generation of New Zealanders by contributing to the Trust. You can be part of the future now!

It's quite natural to wonder about the future. Potential contributors may ask in what way they can support the NZART Education Trust throughout a lifetime or beyond. You may have had in your amateur radio activity an experience that has enriched your life, or seen or heard of something special that you wish to help perpetuate. Perhaps the Amateur Service with its many facets of activity, and public serv ice, has made a lasting difference to your life, education and career.

A practical way to ensure future interest in Amateur Radio is by making a bequest to the Trust. The legally binding obligations on the Trust, as set out in its Deed of Trust, ensure that your donation will be preserved and used exclusively for the purpose intended, the promotion and encouragement of education in radioscience. We recommend strongly that a solicitor provide assistance when you are considering a bequest, or any modification to your will, as the law must be considered when executing a bequest. Your solicitor can assist you to tailor your will to your precise needs.

The NZART Radioscience Education Trust is a Charitable Trust founded the NZART Inc to promote and encourage education in radioscience. The Trust's income is tax-free and donations to the Trust are tax-deductible to the extent permitted by the Income Tax Act 1994.

Correspondence regarding the Trust , grant applications and contributions should be addressed to: The Trustees, NZART Radioscience Education Trust, PO Box 1733, Christchurch 8140. Information about the Trust is also available on the NZART web site <http://www.nzart.org.nz/nzart/nzart/trustweb.html>.

Hands on – to RADIO WAVES

Coordinator: Fred Johnson MNZM ZL2AMJ

With support from: The NZART Radioscience Education Trust

The aims of this project:

- To promote an interest in the science and technology ofwireless communications in young people.
- To encourage members of the teaching profession to use amateur radio in school to further their teaching of science and technology.
- To provide education and training for educators in the science and technology of wireless communications.

For further Information: http://www.nzart.org.nz/waves/radiowaves.html

NZART RADIOSCIENCE EDUCATION TRUST

Application for a Grant-in-Aid

Applications are invited from secondary school science teachers and other training providers for Grants-in-Aid from the NZART Radioscience Education Trust to promote the development of projects in the general areas of radio and/or electronics. It is anticipated that these projects will lead to entries in the local area Science & Technology Fair. Grants will not normally exceed $250.00.

Applications should normally be received no later than 30 April of the year of application. Application forms maybe obtained from; The Trustees, NZART Radioscience Education Trust, PO Box 1733, Christchurch 8140, or from <trustee@nzart.org.nz>. Applications should be endorsed by the Head of Science or, for other organisations, the President/Chairerson.

Application for a Grant-in-Aid

(Please type or print)

Name of Applicant _____ Date _____

Name of School/Organisation _____

Postal address _____

_____

Phone ( ) _____ Email _____

Brief description of project(s) _____

_____

_____

Purpose for which grant is requested (eg purchase of equipment, etc) _____

_____

_____

Item(s) requested and cost; _____

_____

_____

At the conclusion of the project materials and/or equipment purchased with this grant shall remain the property of the school/organisation.

I agree to the above conditions and declare that the information given above is correct.

Signed _____ HoD Science / Chairperson

Please send this application form to The Trustees, NZART Radioscience Education Trust , PO Box 1733, Christchurch 8140.

SPAM

Secretary/Treasurer:
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E-mail: zl2kh@xtra.co.nz

Librarian and Archivist:
John Nicholson, ZL1AUB
30 Alfred St
Fairfield
Hamilton 2001
Phone: 07- 855-5435
E-mail: j.nicholson@clear.net.nz

Meetings
The Annual General Meeting is held annually at Queen's Birthday Weekend in conjunction with the NZART Conference.

Aims and Objects
To preserve Amplitude Modulation as a means of Amateur Radio communication.

General
In order to keep expenses to a minimum, membership lists, financial statements, information, etc., sought by members will be sent on receipt of a stamped and addressed envelope. The information sought will be sent as soon as possible.

Nets
There are nets operating at present on AM on 3.850 MHz at the following times:
Friday evenings at 2000 hours (Northern area based).
Those interested are urged to call "CQ AM" on 3.850 MHz AM any evening at 2000 hrs local time if they want a QSO.

Subscription
$5.00, payable once only on joining. A collection will be taken up each year at the Annual General Meeting, and donations will always be acceptable.

Bulletins
Bulletins are sent out regularly by e-mail to those who have provided their e-mail addresses. These are sent by the "blind copy" method so individual's addresses are not circulated to everyone. The bulletins include news, requests for information, parts and equipment available, parts or equipment wanted, plus anything else that might be of interest to members.

WARO

Call-sign Zl6YL

Object
To promote and encourage interest in Amateur Radio amongst women.
WARO was formed in 1961–62 by a small but keen group of YL transmitters and has steadily grown both in numbers and enthusiasm.
For the annual subscription (currently $15.00 (decreasing to $10.00 if paid at the end of August) for New Zealand members) members receive four quarterly Bulletins containing items of interest to operators and friends, with special attention to YL activities.
Associate members — YLs who do not have a transmitting licence are welcome, as are YLs from overseas, many of whom are sponsored by ZL members.
Friends of WARO — persons who support WARO may become Friends of WARO by making a donation of not less than the current subscription.
The **Thelma Souper Memorial Contest** is held annually in early April in honour of our founder. It is open to YLs and OMs and is held on the lower end of the 80 m band.
The **WARO Achievement Award** may be awarded annually to persons nominated by their peers for outstanding achievements in any aspect of Amateur Radio. Nominations close at the end of March each year and the Award is presented at the AGM in June. The form this takes is the Myrtle Earland Memorial Rosebowl in honour of New Zealand's first licensed YL.
WARO also operates several awards including the WARO Award and the Mountain Buttercup Award. For further details on these see the Awards section elsewhere in this Call Book.

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<tedmarg@clear.net.nz>
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Vacant
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Bulletin Editor
Bev Osborne ZL1OS
<zl1os@slingshot.co.nz>

YL Nets
WARO VHF Auckland
Sunday 7 pm NZ time 146.625 MHz (Klondyke)
WARO HF WARO
Mondays 8pm NZ time 3.695MHz ±.
WARO Executive
Second Sunday 0800 UTC 3.695MHz ±.
International ALARA
Mondays 1030 UTC 3.580 MHz. YL "222": Mondays 0600 UTC 14.222 (Net Control June VK4SJ).
VE/VK/ZL: Fridays 0500 UTC 14.148 MHz.

DX sponsorship
It is great to sponsor a YL from another YL organisation – increases your awareness of other countries and their people. We have DX sponsored members from all over the world and it does help to forge greater bonds between all of us. To sponsor a YL contact the Sponsorship Secretary for further information and contacts. It costs the value of a DX membership subscription and gives the chance to exchange news and views with each other.

YL Get-Togethers
These are held regularly throughout the country as well as the annual Get-Together at the time of our AGM in June. Consider going along to these affairs — they are a lot of fun.

WARO Bulletin/Break-In page
Copy is always required for these publications and any news/views of/by or from members are very welcome by the two editors concerned. Photographs are especially welcome – how about sending some in NOW.
Enquiries are always welcome from any YL for membership/fellowship in all of our activities. Feel free to contact any of the above-mentioned YLs or any other member of WARO.
And always be on the lookout for ZL6YL – our own call-sign.

WARO on the Internet
<www.qsl.net/zl6yl> or <www.nzart.org.nz>. Visit the WARO website where you will find past issues of the WARO Bulletin and WARO news. There is also a comprehensive history of WARO, and links to DX YL amateur radio organisations.

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Cat # Q3047. **A$88 + shipping**

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